Winchell Library of Geology

Rock Products

with which is incorporated

CEMENT and ENGINEERING NEWS

Founded 1896

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Chance to Make a Profit, As Well As Credit, Is Present Need

RECENT announcements from Washington tell of the joint labors of the U. S. Treasury Department, the Federal Reserve Board, the National Recovery Administration and the Reconstruction Finance Corporation "to work out a solution of the problems created by a clogged capital market."

IT is universally recognized that an adequate and fluent supply of money for capital needs is essential to industrial recovery; apparently, in line with the accepted view at Washington, the only answer there appears to be "Let Uncle Sam Do It."

AN "authoritative treasury official" is quoted as having said: "Hundreds of small industries are closing up simply because they can't get capital. The Public Works Administration is spending $3,000,000,000, but that won't put back to work the 6,000,000 men that $30,000,000,000 employed in the capital goods industries in 1929."

ROCK PRODUCTS questionnaired its readers last December in regard to their capital requirements, their credit resources, etc. Probably these industries are typical of many others in which small operations predominate. Anyhow, they are the ones directly affected by PWA expenditures.

THE financial difficulties of rock products producers were almost unanimously laid to lack of *profits*, rather than to lack of credit. Local bankers, in many cases, will still loan money to any business concern that is earning a profit, and shows capacity to pay off a loan.

NEVERTHELESS, there are probably many instances where Government loans for working capital will greatly help small enterprises in the rock products industries—and if industry becomes indebted to Government for capital loans, the Government, like any banker, will certainly be convinced of the necessity of seeing that industry makes a profit, if it expects the loans to be repaid.

ALL this to the unsophisticated (like ourselves) seems a very round-about way of "helping business." The Government provides money for PWA construction, ostensibly to help the capital goods industries, but is attempting at the same time to chisel down prices to the point where these same capital goods industries can't fill orders without borrowing from the Government, because their balance sheets and earnings' statements are so rotten no sane banker will make loans on them.

IF the Government really wants to help industry get back on its feet, the sooner it recognizes the place of *profit* in the business recovery program, the sooner we shall have recovery. The reason why banking credit appears so tight is the *fear* and uncertainty of business men that the real aim of the New Dealers may be to deprive them of all opportunity to earn profits. Most of the official news from Washington certainly provides basis for this fear.

—THE EDITOR.

Member A. B. C.
(Audit-Bureau of Circulations)

Member A. B. P.
(Associated Business Papers)

MARCH
1934

The Oldest Publication In Its Field and the Recognized Authority

80,000 MILES OF WIRE

in Golden Gate Bridge Cables

22,000 Ton Cables to be spun by Roebling ... of Roebling Open-hearth Steel Wire ... famed for strength, toughness and stamina

Golden Gate Cables will be 36½" in dia.

IN CONTRAST, a ¾" Roebling Bridge Cable for small suspension bridges.

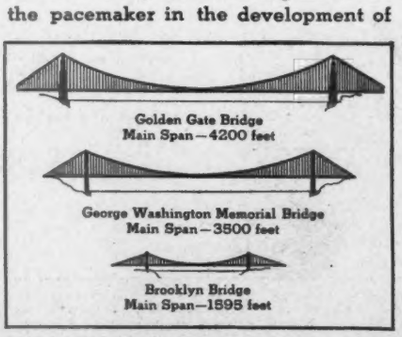
Artist's conception of the great suspension bridge which will span San Francisco's renowned Golden Gate. Roebling will furnish main cables, suspenders, and cable accessories.

BRIDGE HISTORY is being made in San Francisco. A new king of suspension bridges.... the Golden Gate.... soon will be crowned. It will be the longest single clear span in the world.

Just try to picture this new ruler of the bridge world! Its main span will be almost three times the length of the main span of the famous Brooklyn Bridge. It will have the highest and largest bridge towers in the world.

80,000 miles of Roebling Wire will be used for the two main cables.... enough wire to girdle the globe three times. Each cable will be 36½ inches in diameter, weigh 11,000 tons, and contain 27,572 separate wires. Load supporting capacity of the two cables: 215,000 tons.

For over 90 years Roebling has been the pacemaker in the development of wire rope and bridge cable. Full recognition of this fact is evidenced by the widespread use of these Roebling Products for every need from the largest to the smallest. They assure the highest obtainable degree of safe, dependable, economical service.



WIRE ROPE FOR ALL NEEDS... LARGE OR SMALL: No matter how exacting the service, or how large or small the order may be, Roebling can meet your requirements. And your order will receive the same careful, prompt attention, whether for a carload of rope or merely a few feet. John A. Roebling's Sons Company, Trenton, N.J. Branches in Principal Cities.

ROEBLING

The Pacemaker in Wire Rope and Bridge Cable Development

ANNOUNCING THREE NEW
GMC CAB-OVER-ENGINE TRUCKS

T-73	T-75	T-78
15,000 lbs. gross rating	24,000 lbs. gross rating	30,000 lbs. gross rating

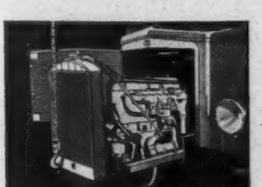
IDEAL WEIGHT DISTRIBUTION ★ ★ MORE PAYLOAD ★ ★ SHORTER TRAIN LENGTH

In these three new cab-over-engine models, the General Motors Truck Company accomplishes a radical improvement in load distribution. In addition, GMC cab-over-engine design also provides increased payload capacity for a given wheelbase.

As developed by GMC, this design meets every demand for power plant accessibility and easy maintenance, and for utmost driver comfort.

Each of the new models is powered by a GMC truck-built, 6-cylinder, valve-in-head engine. Each maintains the GMC standard of *highest sustained torque per cu. in. of displacement.*

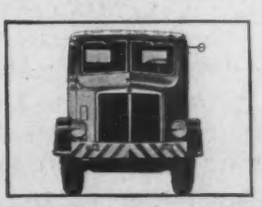
For complete details and prices, see the nearest GMC representative or write to the factory direct.



For major service, the entire engine rolls forward; it can be completely removed.

Adjustments can be quickly made by removing the engine cover inside the cab.

The cab is extra roomy and comfortable, with complete and modern ventilation.



Showing the clear vision and modern design, the grille giving access to the engine.

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GENERAL MOTORS TRUCK COMPANY — *Time Payments Available Through Our Own Y. M. A. C.* — PONTIAC, MICHIGAN

Rock Products

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(Issued Monthly)

March, 1934

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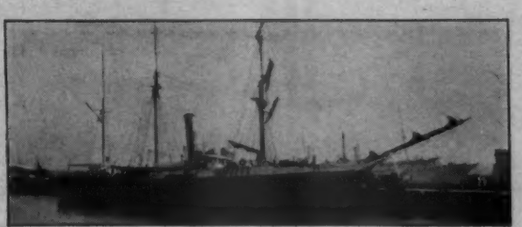
into the Antarctic

WITH ADMIRAL BYRD!

● The Byrd Expedition's ship, "Bear of Oakland," is completely rigged with Macwhyte wire rope. Other Macwhyte wire rope is used for cargo falls, steering and mooring lines, and guying the radio antenna poles.



ADV. NO. 123

Down near the southern tip of the world with Admiral Byrd's second Antarctic Expedition, 5920 feet of Macwhyte wire rope is doing its work and doing it dependably.

Like Admiral Byrd, every wire rope user who demands the utmost dependability in performance can count on Macwhyte wire rope.

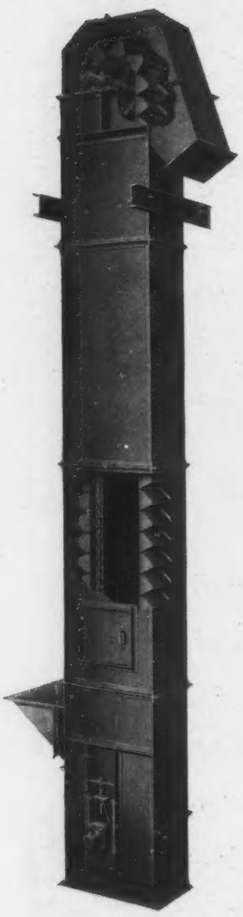
MACWHYTE WIRE ROPE

INTERNALLY LUBRICATED

Both PREFORMED and Regular Construction

MACWHYTE COMPANY · KENOSHA, WISCONSIN

ELEVATING



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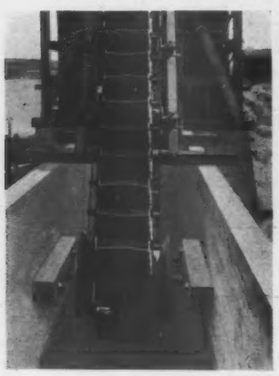
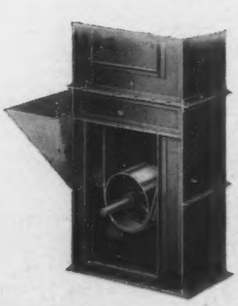


We manufacture in our own shops (and carry stocks at convenient points), all the elements entering into the bucket elevator, such as chains and buckets of malleable, Promal and steel; gears, sprockets, traction wheels, take-ups, casings, boots, etc.



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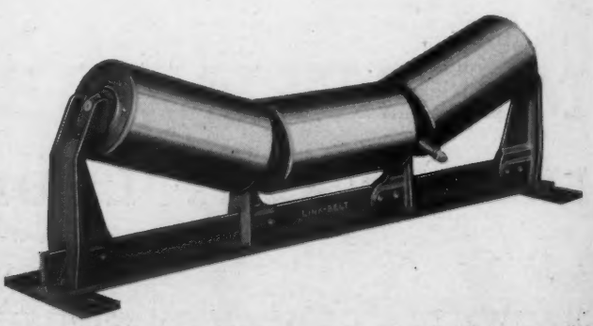
Dependability and low maintenance costs can be assured by the use of Link-Belt conveyors, of the belt, apron, flight, screw, and other types.

The Link-Belt line of belt conveyor equipment includes a type and size of anti-friction bearing idler and return roll for every capacity and service condition. Also, a complete line of trippers, and all accessories. Send for Belt Conveyor Data Book No. 1615.



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For washing, scrubbing, and dewatering, Link-Belt makes a variety of units for any size of plant, character of deposit, or market condition. Send for Book No. 1240.

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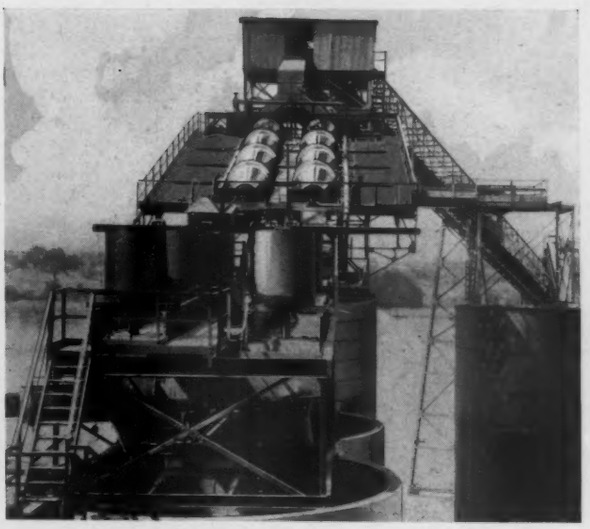

Dull inclined conical screens have won foremost rank in sand and gravel screening equipment.

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SF 25

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PULL WIRE FUSE LIGHTER

Cut the end of the fuse off squarely with a clean sharp knife, insert the fuse in the open end of the lighter until it lightly touches the end of the wire, then pull the wire. Ideal for use in the wind or rain.

For Sure-Fire Lighting

You *can* light safety fuse with a match. Slit the end of the fuse to the powder train, place the head of a match in the slit, and strike the head with a stone (or with the match box if a safety match). The flare of the head ignites the powder.

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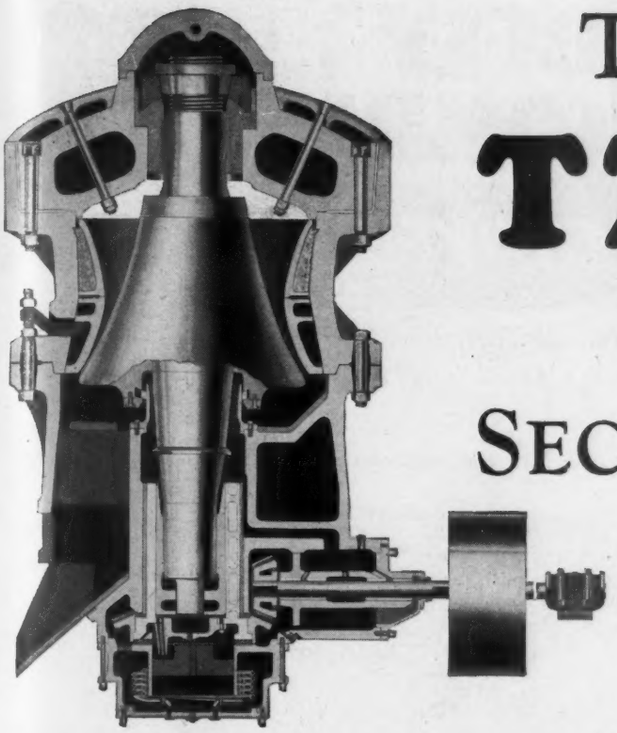
These pamphlets give you the facts about these lighters and other Ensign-Bickford Blasting Accessories. Sent on request without charge.

SF 24

ENSIGN-BICKFORD SAFETY FUSE

ENSIGN-BICKFORD FUSE LIGHTERS



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BECAUSE—it is a breaker of GREATER CAPACITY at SMALLER-THAN-USUAL SETTING. It makes less OVERSIZE than others and has LARGER RECEIVING OPENING and GREATER RATIO OF REDUCTION. It has NO CHOKING POINT and is provided with SIMPLE MEANS of making adjustment for product size, over a wide range. It is adaptable to service in the hardest materials. Many additional features make the T Z Reduction Crusher a breaker that sets a new standard. Built in six sizes, from 12 to 1,000 tons capacity. See our bulletin 2110.

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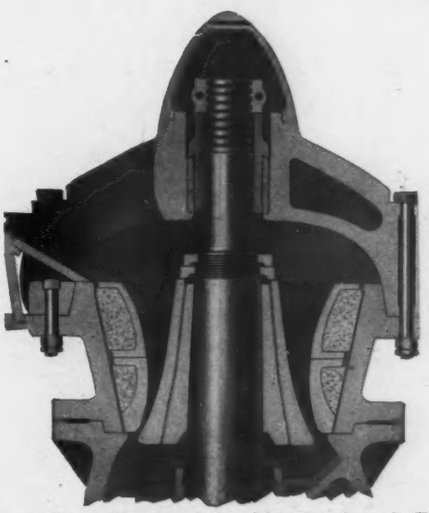
Both the TZ and BH machines have all of the patented features of the famous Traylor Bulldog Gyratory Crusher.



A No. 6 Gates Gyratory Crusher Fitted with Traylor Original Patented Bell Head and Concaves.

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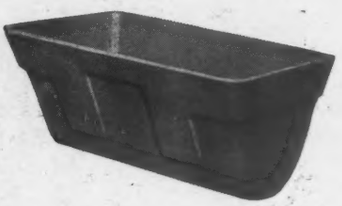
REX DUROBAR CHAIN
(At the extreme right)

REX LEY-BUSHED CHAIN
(At the left)

REX Z-METAL BUCKETS



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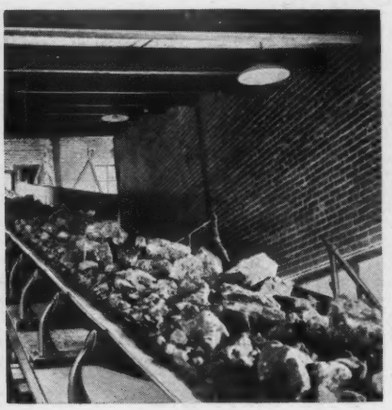
REX Z-METAL CHAIN
The greatest chain ever cast

And for the Conveying...



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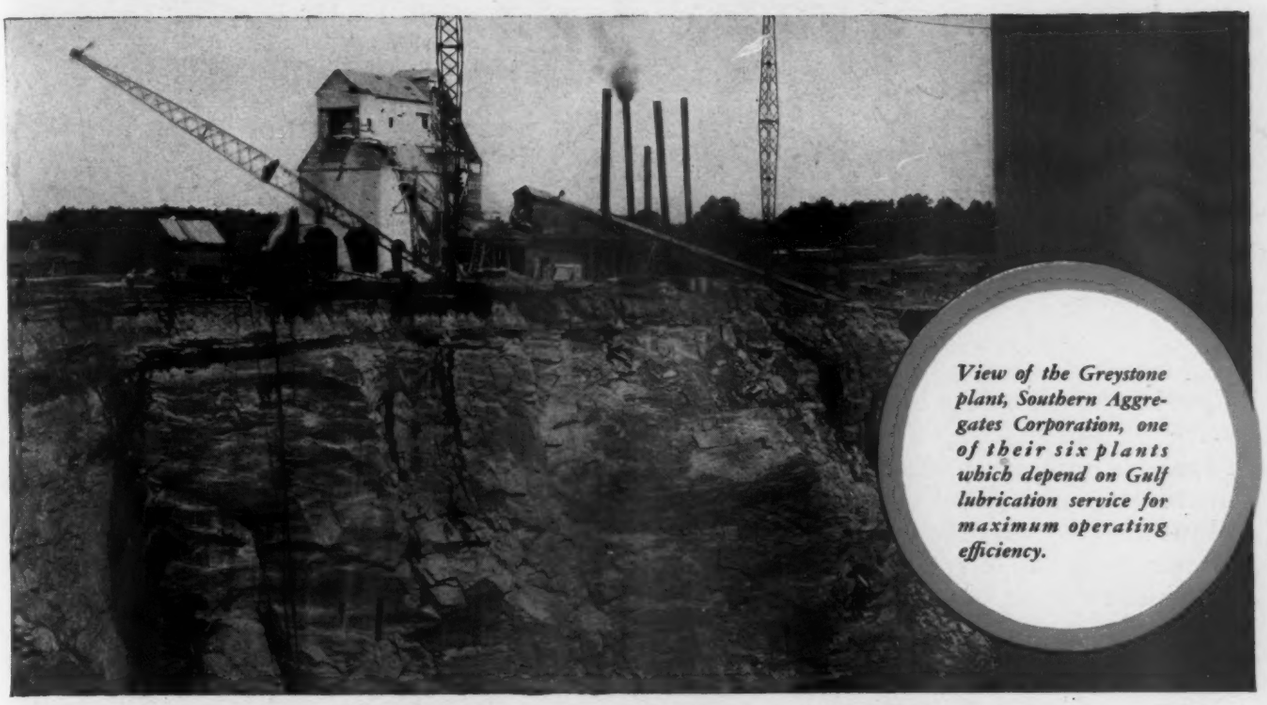
supplies a new measure of

LUBRICATION EFFICIENCY FOR QUARRIES AND ALLIED INDUSTRIES



View of the Greystone plant, Southern Aggregates Corporation, one of their six plants which depend on Gulf lubrication service for maximum operating efficiency.

What Gulf's 7 Point Plan for Industrial Lubrication Means . . .

. . . to the management executive

1. A means of protecting and conserving the company's investment in costly mechanical equipment.

2. A scientific method of measuring lubrication costs and the influence of lubrication on plant costs.

3. A plan by which a real cost-saving program can be set up in all operating departments.

4. Greater plant efficiency from better operating conditions.

. . . to the operating engineer

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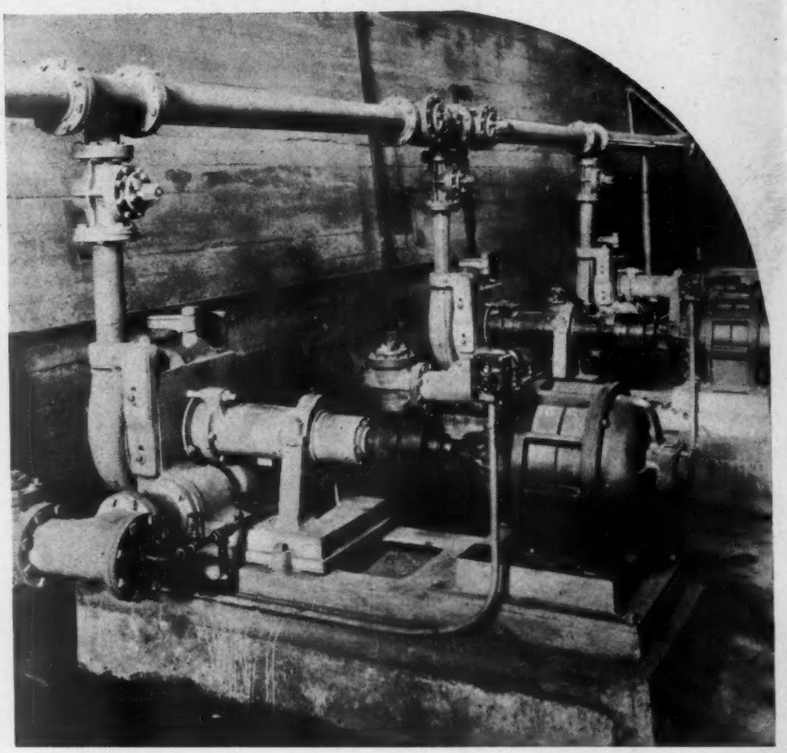
Sizes 1″ to 8″
Belt or Direct Drive



Check up on the performance of the Wilfley Centrifugal Slurry Pump. As there are already many wet process plants using Wilfleys, the chances are there is at least one plant near you. We'll be glad to give you a list of users.

Be sure, when checking up on this pump, you ask about:

1. **Its dependability.**
2. **The advantage of the non-stuffing box feature.**
3. **The clearance take-up.**
4. **The long life of the pumping parts.**
5. **The rapidity with which pumping parts can be changed.**
6. **The protection to the bearings.**

You will find, if you ask, that mills using the Wilfley Slurry Pumps will heartily endorse it.

A. R. WILFLEY and SONS, INC.
DENVER, COLORADO, U. S. A.

WILFLEY
centrifugal SAND PUMPS

Patented

Sole Licensees and Manufacturers

CANADA
Canadian Vickers, Ltd., William Hamilton Div., Montreal, Quebec, Canada

SOUTH AFRICA
Edw. L. Bateman (Pty.) Ltd., Locarno House, Johannesburg

AUSTRALIA
Mine and Smelter Supply Co., c/o F. H. Jackson, 67 York St., Sydney

NETHERLANDS
Dorr-Oliver N. V., Wassenaarsche Weg 40, The Hague

ENGLAND
Dorr-Oliver Co., Limited, Abford House, Wilton Road, London, S. W. 1

FRANCE
Societe Dorr-Oliver, 26-28, Rue de la Pepiniere, Paris, 8e.

GERMANY
Dorr-Oliver Gesellschaft, m.b.H., Nurnbergerstrasse 53, Berlin, W50

UNCLE SAM BUYS HIS 55TH P&H For Irrigation and Drainage

This time it's a P&H Dragline with ½ yard bucket on a 35 foot boom. It has just gone to work on a federal irrigation project out in the state of Washington.

UNIT by UNIT the EVIDENCE PILES UP

On big projects and on small — on PWA jobs and on private work — each week finds new P&H machines going into action — moving more dirt for less money.

P&H

HARNISCHFEGER CORPORATION
Established 1884
4465 W. National Ave. Milwaukee, Wis.
Warehouses and Service Stations:
HOBOKEN MEMPHIS JACKSONVILLE
SEATTLE DALLAS LOS ANGELES
SAN FRANCISCO

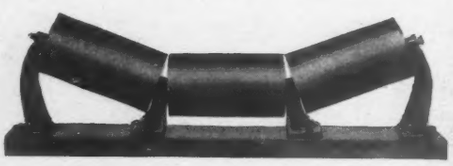
the 50th year

FLASH!!

TENNESSEE VALLEY AUTHORITY CHOOSES ROBINS CONVEYORS *and* ROBINS GYREX SCREEN *for* NORRIS DAM

The large stone crushing and screening plant now being built by the TVA to supply aggregate for the Norris Dam will be equipped with ROBINS BELT CONVEYORS and ROBINS GYREX SCREEN.

ROBINS GYREX SCREEN



ROBINS TIMKEN TROUGHING IDLER

"One-shot' lubrication
Leak-proof seals
Automatic Bearing Adjustment

Norris Dam is the first unit of the Government's vast reclamation and power project in the Tennessee River Valley. Nearly a score of ROBINS BELT CONVEYORS — up to 570 feet in length — ROBINS CONVEYOR BELT and ROBINS GYREX SCREEN will be used in the plant for supplying concrete aggregate. One 36-inch conveyor handles the plant capacity of 375 tons per hour, lifting it 100 feet from the primary crusher to the scalping screen ahead of the secondary crusher. This scalping screen is a double deck 4'x8½' GYREX with SUPER GYRALOY wire mesh having 6" square openings in the top deck and 3½" in the bottom deck. Robins engineers, experienced in all phases of plant design, supplied valuable help to the TVA. Whether your problem is large or small, a complete handling system or a single unit, ROBINS can serve you economically and efficiently.

ROBINS EQUIPMENT
IS BUILT FOR SEVERE SERVICE
TRY ROBINS

ROBINS CONVEYING BELT COMPANY

15 Park Row, New York — **Old Colony Bldg., Chicago**

Boston
Charleston, W. Va.
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Detroit

MATERIAL HANDLING ROBINS EQUIPMENT

Representatives in other principal cities

Philadelphia
Pittsburgh
London
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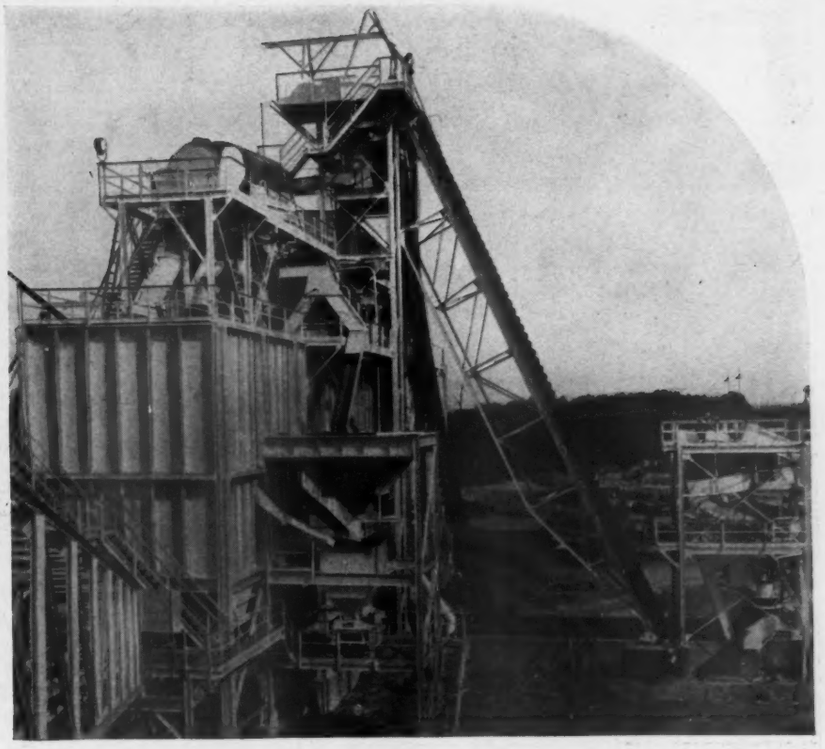
SKF EQUIPPED
BUILT BY
CURTIS & HILL
GRAVEL-SAND
COMPANY



TOUGH JOBS EASY FOR SKF ▼ ▼ ▼ ▼ BEARINGS

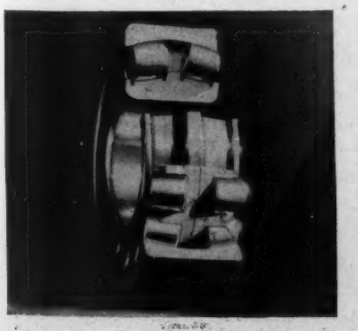
Whether the atmosphere is as clean as a whistle or filled with a million particles of dust . . . SKF's are *always performing* with that smoothness and dependability that enables this Curtis & Hill Gravel and Sand Company plant to produce 5,000 tons a day . . . a capacity that can *easily* be doubled. And SKF's *do their part* in maintaining this large capacity by running smoothly . . . efficiently . . . economically . . . in the 15-inch suction pump on the dredge and in other equipment as well.

The rock products industry offers no "soft" jobs to any bearing . . . only tough . . . gruelling work in an abrasive-filled atmosphere . . . digging . . . loading . . . lifting . . . day in and day out . . . with no time off.

That's the kind of work SKF's have been doing in this plant, "one of the largest and ultra-modern," since 1931 . . . and in this time they have met *every* demand with rugged reliability . . . long life . . . little maintenance . . . and *no adjustment.* This is why SKF's are preferred by men who demand the utmost in bearings.

3183

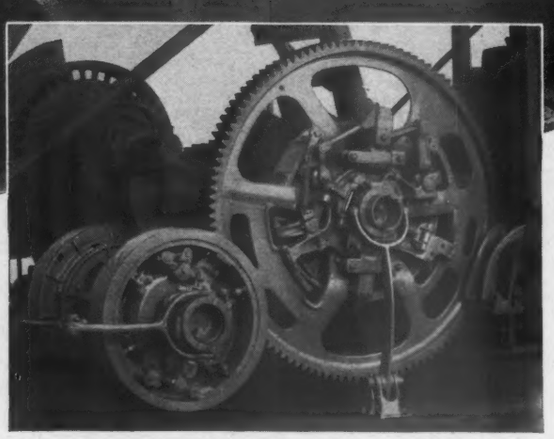
● *You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little*



SKF INDUSTRIES, INC., FRONT ST. and ERIE AVE., PHILADELPHIA, PA.

SKF
Ball and Roller Bearings

KOEHRING



HYDRAULICALLY CUSHIONED CLUTCH

The Hydraulically Cushioned Clutch sets firmly, without chattering—is positive, without constant adjustments — takes hold of the load with smoothness and ease, eliminating jerking of machinery and physical strain of operators.

Announcing the New 701 - 1 3/4 yd. Shovel

KOEHRING again justifies its leadership in the shovel field through the presentation of the NEW 701—a leadership that has been established and maintained from year to year as a result of outstanding improvements in design and construction.

The Koehring Hydraulically Cushioned Clutch is the latest advance — revolutionary in design, it provides an *ease of operation* far beyond normal standards.

It will be to your advantage to *know* the Koehring 701—*know* the many reasons why your production will be definitely increased—*know* why you can count on operating results *beyond* past accepted standards in the shovel field.

Descriptive bulletin upon request!

KOEHRING COMPANY

MILWAUKEE *Division of National Equipment Corporation* WISCONSIN

GRINDING DRYING SEPARATING With ONE Mill

WHENEVER a drying problem enters into your production of powdered materials, consider the advantages of the Raymond ROLLER KILN MILL which combines DRYING with PULVERIZING and SEPARATING, all in one machine.

It insures an operating saving up to 50% or more and gives superior results, because it

Eliminates separate dryers
Shortens time of processing
Assures dustless, automatic operation
Gives close control over the product.

Limestone manufacturers say costs are cut in half by using the Kiln Mill to remove moisture while grinding.

Gypsum producers tell of increased profits and improved quality, obtained by calcining and pulverizing gypsum with the Kiln Mill.

Users of powdered fuel report that the Kiln Mill is the cheapest method of grinding coal and firing it direct to the furnaces.

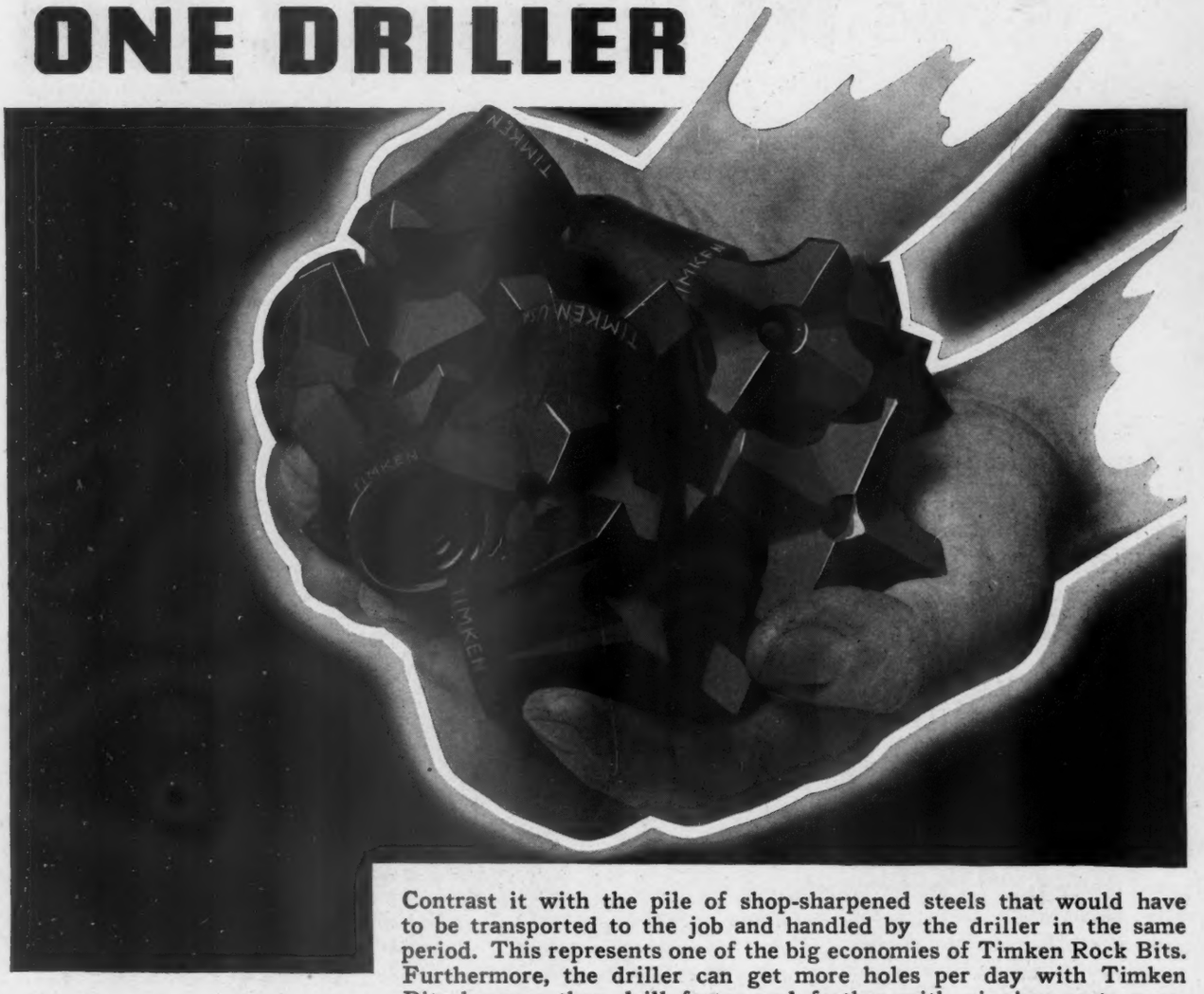
If you make any kind of rock products, get the facts about the Kiln Mill—built in any capacity up to 40 tons per hour —for any fineness up to 99.9% through 400-mesh.

RAYMOND BROS. IMPACT PULVERIZER CO. Main Office and Works: 1307 North Branch Street, Chicago. Sales Offices in New York and Los Angeles.

RAYMOND

PULVERIZING, SEPARATING, AIR DRYING AND DUST COLLECTING EQUIPMENT

A Day's Supply of TIMKEN ROCK BITS *for* ONE DRILLER

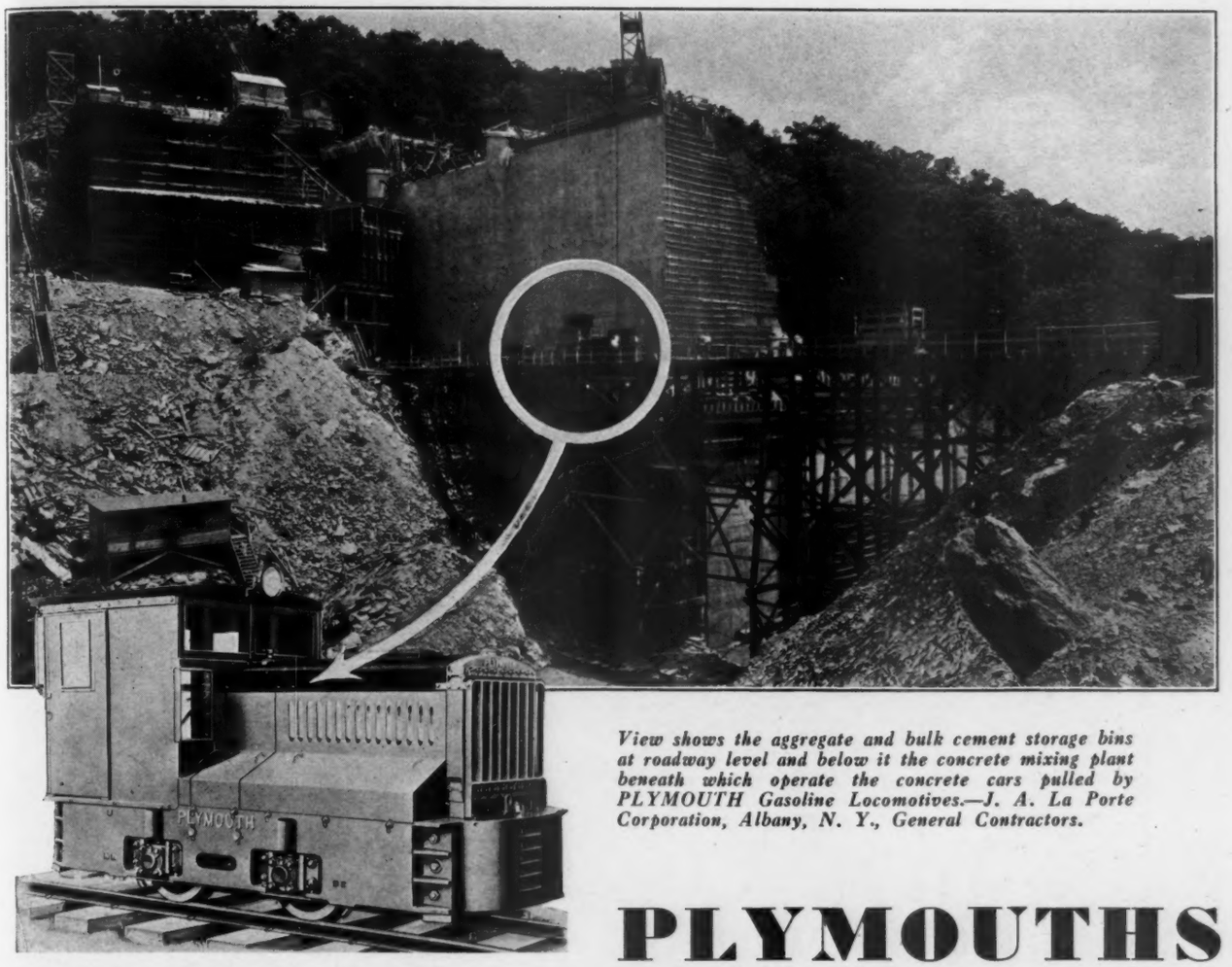


Contrast it with the pile of shop-sharpened steels that would have to be transported to the job and handled by the driller in the same period. This represents one of the big economies of Timken Rock Bits. Furthermore, the driller can get more holes per day with Timken Bits because they drill faster and farther with nipping costs practically eliminated.

The combination of Timken fine-grained electric furnace steel and Timken heat treatment produces bits that are supremely tough and wear-resistant in any kind of rock—bits that hold their gauge extremely well. It would pay you to use Timken Rock Bits for this reason alone, but in addition there are the savings resulting from the Timken removable feature to be considered—such as re-sharpening cost cut to the bone; steel investment radically reduced. Timken Bit economies and other advantages can be demonstrated on your own work. We will be glad to do this whenever you are ready. Write for complete information.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS



View shows the aggregate and bulk cement storage bins at roadway level and below it the concrete mixing plant beneath which operate the concrete cars pulled by PLYMOUTH Gasoline Locomotives.—J. A. La Porte Corporation, Albany, N. Y., General Contractors.

PLYMOUTHS were in constant service at the Pretty Boy Dam!

Pretty Boy Dam, Baltimore's new secondary water reserve, adds 20,000,000,000 gallons of water to the present supply. Here two 8-ton PLYMOUTHS were in constant and satisfactory service since April, 1932, hauling concrete cars back and forth on the wood trestle on the upstream side of the dam to deliver the aggregate concrete from the mixers to the hoppers.

Wherever you see an important job of construction, there also you will almost always see PLYMOUTH Locomotives in service.

Send for Bulletins describing the Plymouths we recommend for general construction work.

PLYMOUTH LOCOMOTIVE WORKS « « Plymouth, Ohio

PLYMOUTH

Gasoline and Diesel Locomotives

We offer you a

VIBRATOR

Whose Performance is under your absolute control

Common Sense

No materials screen alike. The amount of vibration even requires variation from day to day when the material apparently is the same. Hence fixed vibration obviously fails to give maximum efficiency. That's why plant-controlled JIGGER SCREENS are preferred!

The JIGGER SCREEN

is one screen that obeys you. Its vibrations are not set at the factory. YOU control them in your plant. That's why over 50% of JIGGER installations are replacements of other types of screening equipment.

Ask for Full Particulars.

PRODUCTIVE EQUIPMENT CORP.

210 E. OHIO STREET CHICAGO, ILLINOIS

"ED" AND "RED" TALK OVER THE NEW MARION LINE
"DIDN'T I SAY, 'RED', YOU WOULD LIKE THIS MARION CHAIN CROWD?"
"Sure you did, Ed . . . but you don't know the half of it. When it comes to digging an accurate grade . . . working in tough going . . . straightening out bad spots that are hard to get at . . . or shaking the dipper . . . you just can't beat it."
"How do you like its smooth operation, Red?"
"Fine . . . it's the fastest and most reliable Crowd Mechanism I've ever handled."
● Every MARION CLUTCH TYPE EXCAVATOR is equipped with a chain crowd, assuring positive, powerful and flexible crowding, regardless of conditions. Chains individually adjusted . . . length unchanged when boom is raised or lowered . . . load evenly divided . . . low chain speed . . . ease of adjustment are among the most desirable Marion Chain Crowd Features.
WRITE FOR BULLETIN
A TYPE FOR EVERY JOB
MARION
STEAM SHOVEL COMPANY
MARION, OHIO, U.S.A.
SINCE 1884
STEAM · ELECTRIC · GASOLINE · DIESEL

SMALL REVOLVING GROUP

Clutch Drive

Type 340	¾ cu. yd.
Type 351	1¼ cu. yd.
Type 361	1½ cu. yd.
Type 371	1¾ cu. yd.

Three Motor Drive

Type 471	1¾ cu. yd.

LARGE REVOLVING GROUP

Type 5380	8 to 12 cu. yd.
Type 5480	12 to 16 cu. yd.
Type 5560	16 to 20 cu. yd.

THE MARION

STEAM SHOVEL CO., MARION, OHIO, U. S. A.

Electric » Gasoline » Diesel » Steam
Gas-Electric » Diesel-Electric
Shovel » Clamshell » Dragline » Crane » Trench Shovel

INTERMEDIATE REVOLVING GROUP

Two Belt Crawler Class

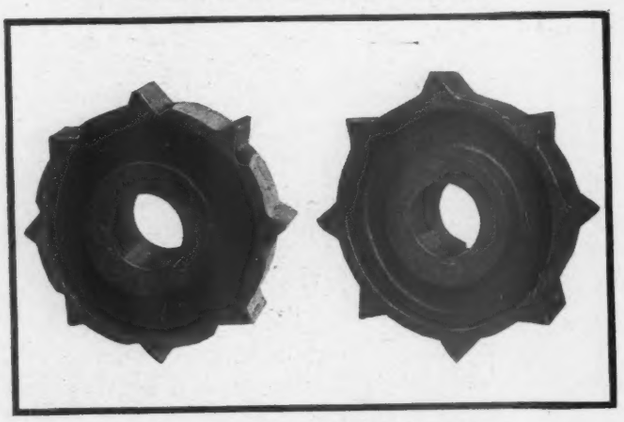
Type 380	¾ cu. yd.
Type 490	2¼ cu. yd.
Type 4101	2½ cu. yd.
Type 4120	3 cu. yd.
Type 4160	4 cu. yd.

Four Belt Crawler Class

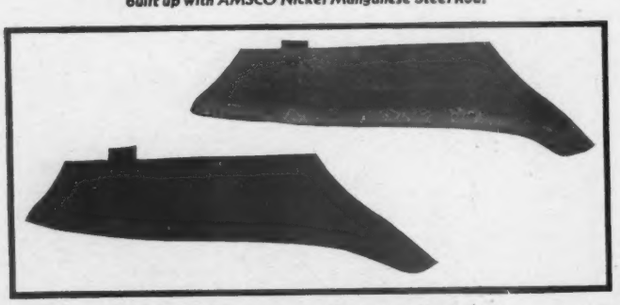
Type 5120	3 cu. yd.
Type 125	4 cu. yd.

REPLACE or RECLAIM?

AMSCO Manganese Steel Bucket Teeth before and after hard surfacing with #459 Rod.



Carbon steel crawler sprocket wheel. Worn and as built up with AMSCO Nickel Manganese Steel Rod.



Plow shares as cast and as hard surfaced with AMSCO #459 Hard Surfacing Rods.

Field Welding of a cracked dipper front with AMSCO Nickel Manganese Steel Rod.

IF IT'S GONE BEYOND REPAIR, SCRAP IT—IF it's cracked or surface worn, weld it and use AMSCO Welding Rods!

AMSCO Nickel Manganese Steel Welding Rod (U.S. Patent 1,815,464), originally made for our own use, is ideal for repair and reclamation welding. Use it for welding worn or broken manganese steel castings and to give an air-toughening, work-hardening manganese steel weld to rolled or cast carbon steel.

AMSCO #459 Hard Surfacing Rod, also an exclusive product, is made for hard-facing parts, subjected to severe abrasion such as Pug Mill Knives, Dipper Teeth, Plow Shares, Screw Conveyor Edges, Pulverizer Hammers, etc. It is easily applied, extremely wear resistant and low in cost. It may be applied to any ferrous article and also over a nickel manganese steel building-up weld.

Users of AMSCO Welding Rod effect big savings in salvaging worn and broken equipment parts, savings frequently approaching 90% of replacement cost. Send for AMSCO Welding Rod Bulletin and confirmation data on the savings others are making!

AMSCO Welding Rod is stocked by leading distributors and AMSCO foundries in all logical lengths and sizes, bare and coated.

AMERICAN MANGANESE STEEL CO.,
377 E. 14TH STREET
CHICAGO HEIGHTS, ILLINOIS
Sales Offices and Distributors in Principal Cities

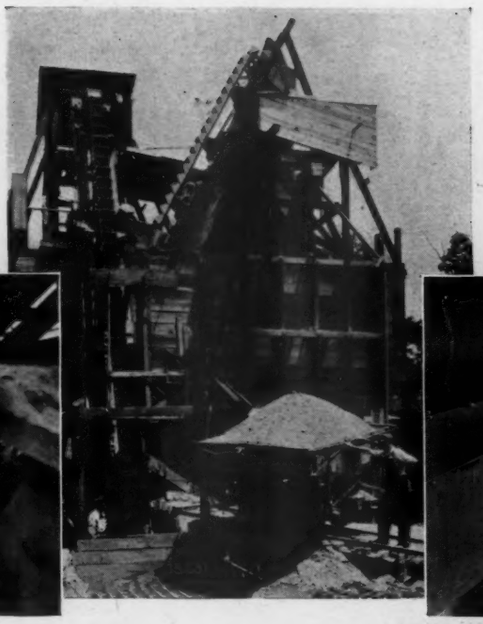
American Manganese Steel Co.,
377 East 14th Street,
Chicago Heights, Illinois.
Gentlemen:
Please send us free samples of AMSCO Welding Rods as indicated below:
— AMSCO Nickel Manganese Steel Rod. Size.....
— AMSCO #459 Hard Surfacing Rod. Size.....
— AMSCO Welding Rod Bulletin.
To be used for.....
.....
Current characteristics.....
Name.....
Company.....
Address.....

USE THE COUPON FOR *FREE SAMPLES*

AMSCO

TRADE MARK REGISTERED

Jeffrey Belt Conveyor (below) handling crushed stone. Three types: Troughing, Picking Belt, and Flat Belt Idlers—all furnished with 4", 5" or 6" diam. rolls, for belt widths up to 60". The center illustration shows two Jeffrey Bucket Elevators serving a sand and gravel plant.



Jeffrey Spiral Conveyor (below) handling cement. Dust-proof covers fit snugly, making an ideal conveyor for light dusty materials. Spiral Conveyors have no return strand—fit snugly under roofs, floors, over bins, through trusses, beams, etc.

VERSATILE

Jeffrey Material Handling and Reduction Equipment is just that. Many tasks can be accomplished with the various units in our diversified line.

There are Conveyors—Apron, Belt, Spiral, Scraper, Electric Vibrating and other types—which provide a constant flow of material at all times.

Bucket Elevators—in any style or size you need—intermittent or continuous—vertical or inclined—malleable, supermal or steel buckets—any size chain, for the light or heavy job.

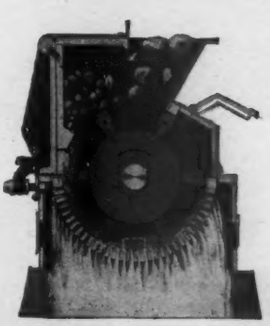
Crushers and Pulverizers—made in several types for reducing almost every kind of material used in the rock products industries.

Screens—Feeders—Sand Settling Tanks—Portable Loaders—etc.

Write for complete information and literature.

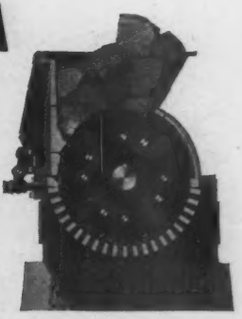
Jeffrey-Traylor High-frequency Vibrating Conveyor.

Jeffrey-Traylor F B Double Deck Vibrating Screen.



Jeffrey Reduction Units

There are Jeffrey Pulverizers and Crushers for reducing stone, gravel, boulders, gypsum shale, trap rock, coal, etc., to any desired fineness. Two types are shown here—the Type B Pulverizer (left) and the Flextooth Crusher (below).



The Jeffrey Manufacturing Company

935-99 North Fourth St. Columbus, Ohio

New York	Boston	Chicago	Denver
Buffalo	Scranton, Pa.	Huntington, W. Va.	Salt Lake City
Rochester, N. Y.	Cincinnati	Milwaukee	Birmingham
Philadelphia	Detroit	St. Louis	Dallas
Pittsburgh	Cleveland		

Jeffrey Manufacturing Company, Ltd., of Canada
Head Office and Works, Montreal
Branch Offices, Toronto—Calgary—Vancouver

NRA MEMBER U.S. WE DO OUR PART

JEFFREY
MATERIAL HANDLING EQUIPMENT

GRINDING MACHINERY

● UNI-KOM ●
UNIDAN TUBEMILL
KOMINUTER PYRATOR

For GRANULATING and PULVERIZING
WET or DRY

Reduce Your Grinding Costs by Installing
Modern Grinding Equipment

●

F. L. SMIDTH & CO.

225 BROADWAY NEW YORK, N. Y.

WHAT YOU PAY = First Cost DIVIDED BY Years of Life

697-A

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

SOME buyers figure on disposing of a machine after a few years of service. Others believe in making the old "crock" go as long as she will turn a wheel. No matter where you stand between these extremes, the ability to give you a long life of efficient service must rank as an important essential in the qualifications offered in an excavator.

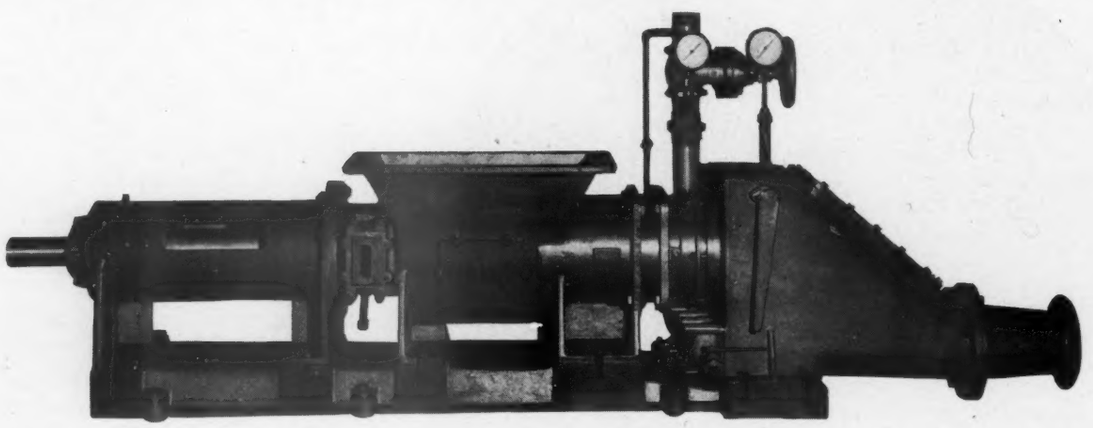
Long life is a matter of balanced design, of extra strength built into the machine to meet the hardest digging conditions, of reserve power, of ease and convenience in lubrication and maintenance, of accurate workmanship, and selection and treatment of materials used in each part to most efficiently stand up to the service required.

Bucyrus-Erie machines have been famous for more than half a century for their long-life, dependable, trouble-free service.

We have again

CUT OPERATING COSTS

in Conveying Dry Pulverized Materials



THE NEW TYPE "H" FULLER-KINYON PUMP

"Lowest cost per ton conveyed"

The following materials are commonly handled by Fuller-Kinyon Systems:

ALUMINA
BAUXITE
CEMENT
CEMENT RAW MATERIALS
CHALK
CLAYS
COKE DUST
FELDSPAR
FLINT
FLUE DUSTS
FULLERS EARTH
GLUTEN FEED
GRAPHITE
GYPSUM
KAOLIN
LIME
LIMESTONE
MANGANESE DIOXIDE
PHOSPHATE ROCK
SODA ASH
SODIUM BICARBONATE
STARCH

Our Engineering Department will gladly furnish estimates for complete systems for any of the above or equivalent materials.

This remarkable, low pressure pump automatically adapts itself to the most economical power input under variable load conditions. It is easily adjusted, while in service, to the minimum power necessary to convey full capacity. High efficiencies are maintained if its load is decreased, as when handling the output of less than the full number of mills, or when material "hangs up" in the bin. Its operation is smooth and stable at remarkably low air pressures, thus offering a substantial saving in compressed air.

It retains all of the operating advantages of the Type "F" Pump, introduced nearly two years ago. The material seal is retained, but kept at a minimum density by a movable check valve, thus providing high screw efficiencies and low motor loads. The screw can be removed through an opening in the check valve body, without disturbing the bearings, etc. All important parts are readily accessible for inspection, and this, together with automatic lubrication, insures continuous operation with negligible attention.

These improvements are covered by patents in the United States and principal foreign countries.

Fuller Company
CATASAUQUA, PENNA. U. S. A.

Chicago: 1118 Marquette Bldg.
Paris: E. Constantin, 105, Rue Lafayette.
Hamburg: Claudius Peters, Wallhof, Glockengiesserwall 2.

Pulverized Material Feeders and Batchers
Airveyor,—pneumatic conveyor
Compressors and Vacuum Pumps

STATIONARY and PORTABLE **FULLER-KINYON** ***CONVEYING SYSTEMS***

Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXVII Chicago, March, 1934 Number 3

Recovery Progress—Trends

NRA continues to become more and more snarled up in anti-trust law agitation, price-fixing difficulties, and labor disputes. Bernard Kilgore, in a recent article in the *Wall Street Journal*, sums things up as follows:

"The NRA picture doesn't lend itself to simple analysis. Cries of 'Monopoly!' and 'Restraint of trade!' presumably heard in behalf of the 'little fellow' have worried some employers. In their way of thinking, labor's right to organize under industrial codes must be offset by capital's right to organize or the whole carefully balanced theory of the NRA falls down. Certain labor leaders, on the other hand, look at it quite differently and are thoroughly convinced that the 'New Deal' has not yet proved to be a 'square deal.'

"But the price problem is in the background of much of this. General Johnson recently stated he was opposed to price-fixing in codes but that he approved of 'cost of production' minimums on prices.

"To an outside observer who tries to remain neutral, it would seem that there is no essential difference between these two schemes and that the latter, if anything, is more complicated than the former. 'Cost of production'—even with all the guides that modern accounting methods can provide—remains a phrase that can mean all things to all men. A great deal more is certain to be heard about it."

Code Writing Progress

National Recovery Administrator Hugh S. Johnson said recently that the "codification" of industry was about 90% completed on the basis of number of employes to be placed under codes, but only half completed on the basis of number of industries in the country.

Plans to Help Finance Small Business

Another scheme is contemplated to overcome the opposition of small business to NRA code administration. Division Administrator, A. D. Whiteside, and Robert H. Montgomery, head of the research and planning division, NRA, have been planning to recommend immediate credits to small employers, on the theory that their objection to some features of their codes is based on inability to finance cost increases. The plan was discussed between the President and the governor of the Federal Reserve Board, February 15. The proposed scheme would not involve the Government in the business of making direct loans to industry, but would authorize the RFC to guarantee 80% of the amount of loans by banks for capital purposes, the banks taking only 20% of the risk.

Local Self-Government for Small Business

NRA is reported to have come to the conclusion at last that a good deal of business is not "big business," and can't be nationalized by writing and administering national codes, so regional self-government under regional codes is the new formula. National codes will continue to be stressed for retail stores, filling stations and "outlets for productive enterprises of a national character." But other trade and service industries—which means the industries devoted to dealing directly with the consumer either selling him something or performing a service for him—will be left largely to the local agreements except that national wage and hour regulations will apply. Under the new

Recovery evidence in the West

policy, national service codes already in existence will be continued and their wage and hour provisions will prevail. But fair practice regulations and prices will be entirely in the hands of local committees. The program amounts to indefinite continuation of the President's Re-Employment Agreement for these industries with public opinion left as the one real agency for enforcement. The local committee can withdraw Blue Eagles from violators but that is all. In order to help public opinion along in these and other industries Administrator Johnson ordered that all employers under the Blue Eagle display conspicuously official copies of the wage and hour regulations under which they are supposed to operate.

President to Address Big Code Authority Conference

Some 7000 members of the code authorities of the various industries have been invited to Washington D. C., March 5, to take part in a conference "to consider the possibilities of increasing employment, protection against destructive competition and against excessive prices and monopolistic tendencies, the elimination of inequalities and inconsistencies in codes, the position of small enterprises, and the vast problem of code administration and the organization of industry for self-government." Following the opening session, March 5, to be addressed by the President and General Johnson, the conference will divide into several group meetings to be followed by group conferences of Code Authorities and Code Committees with the Administration and a final conference of selected delegates of each Code Authority and Committee with the Administrator. As now tentatively outlined the group conferences will discuss:

Group I. Possibilities of increasing employment; wages and hours; comparative situation of capital goods and consumer goods industries.

Group II. Trade practices; Costs and prices; protection against destructive competition; and against excessive prices and monopolistic tendencies.

Group III. Trade practices: Control of production, limitation of machine hours; restriction of expansion of facilities; ethical practices regulating competitive relationship.

Group IV. Code authority organization: code administration, including compliance and enforcement; inequalities, inconsistencies and over-lapping in codes; inter-industry and inter-code coordination; the financing of code administration; use and control of the Code Eagle.

Group V. Operation of codes in small enterprises; position of minorities.

Sees Menace in CWA

Richard Washburn Child, in a special article from Washington, in the Hearst newspapers of February 14, sees a real menace to Government in a continuation of CWA. His point is that the Government itself is organizing a politically powerful group that is coming to depend more and more on the Government for existence, a group which, under radical leadership, may destroy our present form of government. Rock products producers who see thousands of men turning out pitifully small outputs of sand and gravel or crushed stone in publicly owned or leased plants, inefficiently equipped, extravagantly managed, not safeguarded against fatal accidents, will agree with Mr. Child that these experiments, unless carefully directed, may turn out to be much more expensive than a straight relief program, and much more damaging than a dole. These experiments are more expensive in terms of economic waste because they include the wastes of politicians' graft, and the wastes of communities competing with each other in grabbing the appropriations, and the wastes of dislocation of labor from employment in other directions where the employment would be under normal conditions and promising a future. There may not be the same demoralization as in straight relief, but there is, we are beginning to find, demoralization none the less.

NRA Meets Important Adverse Court Decision

Secretary of Interior Ickes has met with a real legal obstacle to enforcement of the code of fair competition for the petroleum industry, and the whole question of the constitutionality of NIRA has been opened up in the decision of Federal Judge Bryant of Texas in the now famous "hot oil" case. Oil produced above an operator's allowable has been termed "hot oil," and provided the basis of suits filed by the Amazon and Panama refining companies against the Texas Railroad Commission, which fixes field allowables, and against the Federal Government. The companies claimed that the commission's order was invalid and that agents of the Department of the Interior had no right to go on their properties to see that the order, issued in connection with federal allocation of national oil production, was observed. Judge Bryant ruled that the Secretary of the Interior could not issue orders which would regulate oil traffic other than in interstate commerce, and said he had the "gravest misgivings if not the absolute conviction" that even that right might not be constitutional. It is said the issue will be rushed to the Supreme Court in hopes the lower court will be over-ruled.

More Interested in Enforcing Anti-Trust Laws Than Codes

True to tradition and to form the Federal Trade Commission, which is supposed to be the chief enforcing agency for the codes of fair competition, appears to be more interested in enforcing the anti-trust laws, which the codes are supposed to have set aside, for the time being, at least. It is still a crime to make a profit. Recently the commission issued a complaint order against ten companies making most of the Nation's viscose rayon yarn, charging them with conspiring to form a price-fixing monopoly. Twenty-two members of an accounting firm also are named, the Commission claiming they aid in maintaining fixed prices by making special audits. The companies are said to have punished price-cutters of rayon cloth by maintaining a cloth-making concern of their own.

Report Sought

A resolution adopted by the U. S. Senate, February 2, at the instance of Senator Borah, Idaho, directed the Federal Trade Commission to investigate and report on: (1) The practice of the steel industry under its NRA code with reference to the price fixed, the increase of price of steel products and such other matters as would give a full presentation of facts touching the industry since it went under the code. (2) Increase in the price of gasoline during the last six months and what the increase means to the users of gasoline throughout the country in the way of additional costs. The investigation is typical of the present stage of code enforcement and inevitable complaints from consumers of higher prices. While it was the deliberate purpose of the code framers with the approval of President Roosevelt to provide shorter hours and higher wages and to eliminate cut-throat competition, all tending to increase prices, the critics of the NRA among the radicals in Congress are shouting that the whole process leads to monopoly and excessive costs to the consumer. The Federal Trade Commission is generally held to be dominated by liberals with a somewhat different viewpoint than the men who have been most influential in the NRA.

Employe Compensation for CWA Workers

Scores of newspaper clippings coming to the editor's desk tell of fatal and serious injuries to CWA and PWA workers in local publically-operated quarries and gravel pits, due primarily, probably, to inexperience, both on the part of the employes and their bosses. In the meantime Congress debated whether the $950,000,000 for CWA and for relief of unemployed should include compensation for these dead and injured workers. For example, Senator McKellar, of Tennessee, said: "I think where a person is out of employment and the Government comes along and graciously gives him employment, he ought not to have the right to make claims against the Government, possibly claims for life compensation and all kinds of claims on account of the work thus given him generously by the Government." This is probably typical of the reasoning of a politician. But private employers of labor who must compete with CWA and PWA are compelled to carry employes' compensation insurance (and they should be compelled to) in spite of the fact that they too are "generously" trying to provide employment; not temporary but permanent employment.

Connecticut Injunction Against NRA Dissolved

The temporary injunction issued by U. S. District Court Judge Thomas, Connecticut, against General Johnson and NRA restraining them from taking action to enforce the code of the cloak and suit industry against five rebellious Connecticut manufacturers (Rock Products, January 10, p. 34) has been dissolved. The cloak manufacturers surrendered and withdrew the action, because they could not obtain Blue Eagle labels to sew on the garments they made, and without the Blue Eagles they could not sell them. The official spokesman for the group said: "Despite the injunctive relief already granted by the court, and because the deponent is anxious from a patriotic spirit to work with the Government officials, and believing and hoping they will see fit to grant the proper and equitable relief that is being sought, and having discussed the situation at length with individuals who are on the staff of the various administrative bodies connected with the NRA, the plaintiffs have decided to withdraw their action and permit the administrative officers to carry out their promises to render proper and equitable relief to the plaintiffs."

Effectiveness of "Open Price" Policies in Danger

Recent hearings before NRA on complaints of administration of codes revealed six types of complaints, all of which were based on price change provisions in codes, according to an analysis submitted to General Hugh S. Johnson by Division Administrator A. D. Whiteside, who conducted the hearings. The principal observations and recommendations made by Mr. Whiteside follow:

"1. The uniformity in prices and excessive price increases which apparently have arisen from the operation of open price agreements in several codes, particularly in those instances where a period of waiting has been prescribed between the filing date and effective date of price lists.

"2. Excessive surcharges and uniform surcharges. In several industries this is largely a history of completed transactions, in a situation not likely to occur immediately.

"3. Activities on the part of groups in trades or industries which are extraneous to the codes but which are apparently the result of collective understandings which have developed through the intimate relationship established between those operating within trades and industries.

"4. Limitations on cash discounts and quantity discounts which may constitute a means of raising prices, and these provisions are inserted in the respective codes as part of the fair practice definitions.

"5. Limitations on the manufacture or distribution of second quality goods.

"6. Interpretations of cost as a level below which no sales shall be made, which have resulted in raising prices to an unjustified level in the interest of the customer or for the permanent welfare of the industry."

Summarizing his conclusions respecting the questions in controversy, Mr. Whiteside said:

"1. The so-called 'waiting period' should probably be temporarily deleted from the majority of open-price provisions. Theoretically this provision has a legitimate purpose. In practical operation it may lead to intimidation and coercion and result in a uniformity of high prices. Opportunities for monopolistic practices are available.

"In the industries manufacturing necessities and basic materials the waiting period will probably result in excessive prices. A possible substitute is a provision for quoting simultaneously to the customers and competitors and others with a justified interest, safeguarded by a provision that a price once quoted must apply for a given period to all customers of the same classes or to all single delivery purchases of the same size class. This period might vary from the 24 hours now provided in a few codes to a month, as conditions in the industry may warrant.

"This does not necessarily imply that this is the only criticism of the open-price clause, but it is the only point upon which a definite conclusion seems warranted at this time. We believe either phases of this agreement and its operating results should be subjected to study."

Not Inclined to Help Cities and States Out of Financial Muddles

In normal times the bulk of public works upon which the rock products industries so largely depend for existence comes from cities, counties and states. Many of these governmental units are now close to bankruptcy. Chairman Jesse H. Jones of the Reconstruction Finance Corp. has opposed the proposal to authorize loans to municipalities on tax anticipation warrants in hearings before the Prall sub-committee of the House of Representatives' banking and currency committee. Mr. Jones said he never thought it desirable for the Government to start lending money to cities and counties. "By and large most of these cities can borrow if they are living reasonably within their means," he said. The whole idea was summed up by Chairman Jones as being impracticable. He pointed out that it would not be feasible to loan direct to the states because of limitations in state constitutions against borrowing. Direct loans to municipalities, Mr. Jones further stated, would also be impracticable because of the political difficulties. Evidently if Mr. Jones' advice prevails it will be federal public works or nothing, for the next few years, at least.

PWA to Sell Bonds of Non-Federal Projects

The PWA fund may be increased a little by sale of bonds acquired by it in helping finance local projects. PWA does not now hold a large quantity of public bodies' obligations, but eventually it may come into possession of some half billion dollars worth. However, the Public Works Administrator's plan is to offer only certain bonds for sale from time to time when marketing conditions appear favorable to the government. The PWA finance division will have charge of the marketing. Bonds which may be offered for sale include general obligation and revenue bonds of states, cities, school districts, counties and other public bodies which have received PWA loans, and which will be repaid at 4 per cent interest.

No More PWA Projects to Be Considered Now

Due to $3,500,000,000 of projects being on file for which money is not available, Public Works Administrator Ickes has halted submission of all new non-federal projects. At the same time he directed his administration to concentrate its efforts on driving the vast total of work now provided. What per cent of 7,000 unallotted projects to be found qualified cannot be determined until examined, Mr. Ickes stated. State engineers have been advised that projects for which no applications have been filed as yet will be considered. "The important job ahead of us now is to get all work under contract and push it as rapidly as possible," the administrator declared.

PWA Peak in Late Spring

The peak of public works construction operations will be reached in late spring, a survey submitted by Harold L. Ickes, Public Works Administrator, has shown.

Continuing Public Works Program Planned

President Roosevelt told newspaper men on February 14 of his program for long range planning of public works, to cost perhaps about $500,000,000 a year, and to include: (1) Methodical development of waterways, water power, flood control, soil erosion preventatives, reforestation, and other public works. On these works employment would be furnished in the manner of the present CCC and CWA. (2) Decentralization of industry through establishment of small industries in rural regions to enable people to make a living partly by farming and partly by factory employment. A start in this direction is now being made in the subsistence homesteads, for which 25 millions of recovery funds have been allocated. (3) Government purchase of submarginal lands unfit for cultivation, which would be added to the public domain and devoted to forest development. The President named as a committee to draw up the plans Secretary of the Interior Ickes, Secretary of Agriculture Wallace, Secretary of War Dern and Secretary of Labor Perkins. As chairman of the committee the President appointed Mr. Ickes. Apparently no mention of federal-aid highway construction was made. It is to be hoped this will be a program in itself, for this is a public works, perhaps the only one, for which "the long range planning" has already been done.

Aggregate Producers Make and Sell Concrete for San Francisco Bridges

Merchandising Aggregates Carried Out on a Grand Scale to Its Ultimate Solution—Some Things Aggregate Producers Must Know About Concrete

By Edmund Shaw,
Contributing Editor, Rock Products

THE two great bridges which will connect the city of San Francisco with other parts of the San Francisco Bay district will have something like 1,600,000 cu. yd. of concrete in their piers and approaches. The interesting thing to producers of concrete aggregates is not primarily the size of the job; it is that the producers of aggregate are the ones who are making and placing the concrete.

Some years ago a few enterprising producers of aggregate appreciated that their customers bought aggregates to make concrete; and they set up plants to sell concrete as well as aggregates. This has been the salvation of more than one large company in the years of depression that followed. These bridge jobs are an illustration of aggregate merchandising on a large scale.

The concrete for the Bay Bridge, the seven miles of bridges and tunnel that unites San Francisco with Oakland and the other cities to the east, is being supplied by the Henry J. Kaiser Co. Its mixer barges carry the slogan, "Mixed Concrete for Everyone." A part of the aggregate is supplied by another Kaiser organization, the Kaiser Paving Co., whose plant is at Radum, Calif. The remainder comes from a group of producers including the Pacific Coast Aggregates, Inc., the California Rock and Gravel Co., Blake Bros. Co. and the Basalt Rock Co. These are working under an agreement to supply tonnages allocated according to what the producer can furnish after supplying the demands of his regular market.

This arrangement is working well in every way. But perhaps the chief reason for its success is the system of using the aggregates, which has been worked out by the state engineers in charge of the concrete work. For they have devised methods of inspecting, classifying, handling and mixing the materials whereby uniform concrete is always made, regardless of variations in the aggregates due to their coming from widely separated deposits. Not a single car of aggregates has been rejected and not a car will be rejected so long as the producers live up to the simple and easily filled specifications.

The engineers recognized from the first that variations in the aggregates were inevitable, since they came from so many sources and plants. There was no possibility of mixing in great bins or storage piles to get a uniform product, and the expense of having all the producers make identically graded material was prohibitive. So a scheme was worked out whereby the mix could be readily changed according to the materials that were being received. There had been 43 such changes of mix made when I visited the job. But every mix was of exactly the same water-cement ratio and consistency, and the yield was always that which had been figured in advance.

Specifications Drawn to Fit Aggregates from Various Sources

These results *had* to be obtained. The concrete is all specified by the water-cement ratio, and any divergence from the water-cement ratio specified would call for the rejection of the mix. (The strength and workability for the tools and conditions of placing are also specified.) The methods of placing, such as conveyor belts and concrete pumps, called for uniform consistency. The pumps simply refuse to function if the consistency is too far from the normal. Economy demanded uniform yield. So uniform is it that a check made on 1,029 cu. yd., one day when I was visiting the job, showed only 0.03% difference between the actual and the calculated volume; and I was told that this is about the difference that is usually found.

To me, this making use of all that the producer can supply, is the outstanding feature of the concrete work on this job. I am going to enlarge on it, at the risk of having the ordinary reader frightened off by technical details, because I believe it is of great importance for all producers of concrete materials to understand it.

Fortunately I can do this, because, through the courtesy of the Department of Research and Testing Materials of the California Division of Highways and Bridges, headed by T. E. Stanton, I was allowed to visit all parts of the work and take notes and pictures. During my stay I was the guest of Stanley M. Hands, the engineer in direct charge of the concrete making. Rock Products readers do not need to be told of Mr. Hands' knowledge and capabilities as a concrete engineer for they are familiar with his work both as an Iowa stone producer and as a concrete specialist, from the articles which he has written.

Concrete Requirements

The state's engineers gave over a year to the testing of materials, and concretes made from them, and were able to advise the engineers who designed the batching plants and the barges which carry mixers and batched materials, as to the conditions which must be met.

The first of these was the quantity. At first 2,000 cu. yd. per day were poured; but this was raised to 3,500 cu. yd. It must be remembered that this 3,500 cu. yd. is not all poured in one place. It is poured in twenty or more places, strung out over 7 miles of water in one of the world's busiest harbors, where the water is churned continually by the ferry boats that at certain hours of the day move in procession from one shore to the other. In foggy weather barges cannot be drawn across these ferry lanes with impunity, and the insurance companies forbid it. And in bad winds the barges cannot be held at some of the piers.

Emergencies to Be Met

The work has its dramatic side. One bad night it was found that one of the coffer-dams surrounding the place where a pier was to be built was working loose in the heavy seas and that all that could be done to save it was to fill the bottom with concrete as soon as possible. This being an emergency, the state exercised its right and took charge for a few hours.

There was not nearly enough of aggregates on hand to make the concrete needed, but wires to the state's inspectors at the various producing plants disclosed the situation, and they were informed that any clean material to make concrete was wanted in a rush. The railroads gave the fullest coöperation.

This coffer-dam was where it could be reached by a ramp from shore, so that the concrete was poured by mixer trucks. Carpenters worked at top speed building these ramps from 16x16 and other large timbers brought from other parts of the work. By midnight it was ready, materials were coming in steadily from the plants and the mixer trucks, all that could be secured, began a

steady flow of concrete into the big steel box, that did not cease until some 15,000 cu. yd. were in place.

Every yard of the concrete was of the specified water-cement ratio and consistency, although the coarse aggregate varied from pea gravel to 3-in. maximum. The difference, of course, was made up by using more cement with one than the other; but in a time like this the cost of a little more cement is hardly to be considered.

There have been other times when high winds necessitated extraordinary efforts to keep things moving, for once a big pour is started it should never stop. Men have had to stay on the little islands of piers and caissons not only over night but sometimes for days and nights at a time. However, these are only the experiences that everyone who works on such jobs knows he must face occasionally, and he thinks of them as "all in the day's work." Fortunately all parts of the job are connected by radio telephone so there is not the anxiety and worry that there used to be when such things happened.

Placing the Concrete—Necessity for Uniform Consistency

In other cases these seals, as the great masses of concrete at the bottoms of cofferdams are called, are placed by tremie pipes, which, as the reader probably knows are merely long vertical pipes with a funnel at the top. They are high enough above the water to give a head to the concrete, so that it will flow outwardly from the bottom of the pipe, under water; and the point of discharge is low enough so that it is embedded in concrete all the time. The consistency of such concrete has to be such that it will flow readily through the pipes, but it must not be in the least sloppy or watery. The fluidity is secured by using more cement paste, because the water-cement ratio is the same as with the other concretes.

Caissons are sunk where the coffer-dams are not used, but they are not the caissons in which men work in compressed air. They are big steel boxes filled with steel tubes like silos for cement storage. The tubes with their rounded tops can be seen in some of the accompanying illustrations. The biggest of these caissons is about 170 ft. by 85 ft. in plan; and it will be sunk to bed rock, about 200 ft. below the water level.

The caissons have cutting edges and they cut their way through the mud by the weight of the concrete that is placed around the tubes. Level is maintained by regulating the amount of air that is in the tubes, letting the air out of a high corner until the caisson is level according to a scale on the side. Incidentally this is one method of checking the concrete poured because the weight of the concrete may be determined from the displacement and compared with the calculated and recorded weight. The volume can be found more accurately than in some cases so that the bulking, if any, may be determined.

There are two ways of placing concrete in these caissons, the use of 4-cu. yd. clamshell buckets of the marine type, and of pumps. The pumps, which are of the Chain Belt Co.'s make, are used on the largest caisson, which stood so high above the water when pouring began that it would have been difficult to use buckets. With the pumps, holes to admit the 6-in. discharge pipes were made in the sides of the caisson and the concrete was pumped into place very easily.

As with the tremie pipes, the consistency of the concrete is a main factor in the placing, if the concrete is at all sloppy, the "soup" will run ahead of the coarse pieces and a plugging of the discharge pipe will follow. On the other hand, the concrete must not be too stiff, or it will not pump well, nor will it place so well.

Even where the concrete is to be placed with buckets the consistency must be carefully watched because it is a rule that no free water may show above the concrete even after it has been vibrated in place. And the specific gravity of the mortar is figured for every mix to assure that it will be dense enough to suspend the largest pieces of coarse aggregate while the concrete is being placed.

How Consistency of Concrete Mix Is Controlled

It is this control of the consistency that is the real feature of the mix design methods employed on this job. It is easy enough to design mixes for a given water-cement ratio if the consistency can vary, in fact this may be done almost without design. But to maintain uniform consistency and yield along with a uniform water-cement ratio means that the grading shall plot very closely to a predetermined curve, and the way that this is done while using such a variety of materials is the most interesting feature of the methods adopted.

These begin with the inspection of materials at the source, for at every plant supplying aggregates there is a state inspector from the Research and Materials Testing Department who samples every car as filled. The sample is sieve-tested and a ticket numbered according to the results of the sieve test is placed on the car. The numbers run from 20 to 25, if the car is of sand; 30 to 35, if it is of No. 1 aggregate, and 40 to 45, if it is of No. 2 aggregate. The colors of the tickets correspond to the numbers, and in making up trains of aggregate to be sent to the batching plant, the railroad is asked to set in all cars of the same number together. Hence, as the railroads coöperate in doing this, the mix may be figured for trainloads instead of carloads.

The Materials Testing Department has an office and a small laboratory near the batching plant. Here samples are checked for sieve tests, and determinations of moisture and of specific gravity are made. Moistures run around 4 to 5% and specific gravities, made on saturated, surface-dry samples, are in the neighborhood of 2.70. A special platform scale with special scale-readings provides an easy way of making these determinations. They must be made daily, or several times a day, in order to set the weights on the batching scales for the right amounts of materials.

The grading requirements for the mix are:

Not less than 10% passing 30-mesh.
Not more than 40% passing 3-mesh.
Exactly 45% passing ½-in. round opening.
72% to 78% passing 1½-in. round opening.
100% passing 3-in. round opening (and most of it passes 2½-in).

This grading is adhered to as closely as the grading of the separate products will permit.

To show in detail how the calculations are made, a 5-sack mix, the concrete that is most used, will be figured. The grading of the materials which had been received for that day was:

Passing	No. 2 sand, %	No. 1 rock ¾-3/8-in., %	No. 1-A rock ¾-1½-in., %	No. 2 rock 1½-3-in., %
Sieve No. 80	3			
Sieve No. 40	16			
Sieve No. 30	26			
Sieve No. 20	44			
Sieve No. 10	70			
Sieve No. 3	100	4		
½-in. round		44		
¾-in. round		85	4	
1½-in. round		100	85	8
2 -in. round			100	50
2½-in. round				85
3 -in. round				100

By trial it is found that the percentages of each of these that must be combined to make the required grading are:

No. 2 sand	37.5%
No. 1 rock (*a*)	18.0%
No. 1-A rock	15.5%
No. 2 rock	29.0%

(*a*) Coarse aggregate is generally called rock in California, both gravel and crushed stone being so called in the concrete industry. Slag is not obtainable commercially.

These are percentages of the solid volume of the aggregates that will be needed to make the required volume of concrete. This solid aggregate volume is called *K* by the engineers of the Division of Highways. It is found by subtracting the solid volumes of the cement and water from the required volume of concrete. For the 3½-cu. yd. batch, which is used on this job, the formula for finding *K* reads:

K equals 3½ [27 — 5 (0.483 + 0.85)], which equals 71.16 cu. ft.

In this, 3½ is the number of cubic yards; 27, the cubic feet in one yard; 5, the number of sacks of cement per cubic yard; 0.483, the cubic feet solid volume in one sack of cement, and 0.85, the cubic feet of water to be used per sack, the water-cement ratio being 0.85.

The solid volume of each aggregate will be, therefore:

No. 2 sand, 37.5% of 71.16,	= 26.69 cu. ft.
No. 1 rock, 18% of 71.16,	= 12.81 cu. ft.
No. 1-A rock, 15.5% of 71.16,	= 11.03 cu. ft.
No. 2 rock, 29% of 71.16,	= 20.63 cu. ft.

The weight of anything is its solid volume times its specific gravity, times the weight of 1 cu. ft. of water, so the weights of the above volumes will be: (*Next page*)

Looking down the wharf, Oakland, Calif., from the batching plant to the car hopper and belt

Material	Volume cu.ft.	Specific gravity	Weight 1 ft. water, lbs.	Weight wanted
No. 2 sand,	26.69 ×	2.69 ×	62.5 =	4,485 lb.
No. 1 rock,	12.81 ×	2.69 ×	62.5 =	2,154 lb.
No. 1-A rock,	11.03 ×	2.70 ×	62.5 =	1,861 lb.
No. 2 rock,	20.63 ×	2.71 ×	62.5 =	3,494 lb.
Cement, 17.5 sacks at 94 lb.			=	1,645 lb.
Water, 17.5 × 0.85 (cu.ft.) × 62.5 =				930 lb.
Total weight, 3½ cu. yd. concrete..				14,569 lb.

The average 28-day strength of this concrete is 3,890 lb. per sq. in.

The figure 14,569 may be checked in various ways, one of which is always used; figure weights back to volumes. A simple method accurate enough to show serious errors is to divide the total weight, as found above, by the number of cubic feet, 94.5, giving the weight per cubic foot. In this case it is 154.2, which is about right for a 5-sack mix. The 6-sack mixes are lighter, weighing about 151.5 lb. per cubic foot with more water and correspondingly less aggregate, because the water-cement ratio is approximately the same whether 5-sack or 6-sack mixes are used. Later for the structural concrete 6 sacks will be w/c = 0.72.

In calculating mixes the specific gravity of the mortar is always watched to see that it is sufficient to suspend the coarse aggregate. It should be greater than 2.00. In this case it is 2.27, being calculated as follows:

26.69 cu. ft. No. 2 sand weigh.....	4,485 lb.
8.45 cu. ft. cement weigh	1,645 lb.
14.88 cu. ft. water weigh	931 lb.
50.20 cu. ft. mortar weigh	7,061 lb.

7,061 divided by (50.20 × 62.5) = 2.27, the specific gravity.

The weights which were found above are dry weights, or better stated, the weights of saturated surface dry materials. Corrections have to be made, plus or minus, according to the moisture carried by the aggregates. These corrections are easily found by the special moisture and specific gravity scale mentioned. The corrected weights are then set on the scale beams at the batching plant.

A quite different mix is used for pouring in tremie pipes, one such mix that was being batched while the writer was present being:

No. 2 sand	5,600 lb.
No. 1 rock	2,019 lb.
No. 1-A rock	2,241 lb.
No. 2 rock	1,345 lb.

This was used with 6 sacks of cement per cubic yard and a water-cement ratio of 0.85 as with the other concrete. The average strength at 28 days is 4,004 lb. per square inch.

All the concrete except tremie is placed with internal vibrating machines, as is done on so many large concrete jobs nowadays. This saves labor, but the great advantage is that it works the concrete over and forces it into every part of the form. On this job the pneumatic form of vibrator used is so "strong" that it has to be pulled about with ropes instead of being held in the hands.

Mr. Hands says that all his calculations show that the entrained air is much reduced by internal vibration. The "average" that might be 1½% to 2% with concrete placed in the ordinary way is reduced to a small fraction of 1%.

Materials for Concrete—Cement

These two bridge jobs are interesting to the makers of cement because of the changes in cement specifications that have been made. As originally drawn, the cement specifications were the usual ones, stating that the cement must conform to the A. S. T. M. standard specifications. But before the work was well begun two questions came up, brought out by recent research. One was the advisability of using low-heat cement, the kind that evolves heat slowly as it hardens, and which has been used on some big dam jobs recently. It was decided that the cement should be of a type that evolves heat more slowly than some cements which have been made in late years in response to the demand for high early strengths.

Another matter considered was that of complete protection against the action of sea water. This is something difficult tc discuss briefly without giving a wrong impression of the effect of sea water on concrete made with standard portland cement on the Pacific Coast. Blocks of such concrete have been submerged in the ocean near Los Angeles for twenty years and examination has shown them to be in practically the same condition as they were when they were placed there. On the other hand, there are sea walls exposed to the waves and to spray that are badly disintegrated, as everyone knows who drives the coast highway. So there would seem to be a real need for a cement and concrete made especially to resist sea water, if the concrete is to be exposed alternately to the water and the air.

There is at least one special cement which has proven highly resistant to sea water through some years of testing, and it also meets the standard A. S. T. M. specification for portland cement. The difference between it and ordinary portlands is that it is high in iron and low in tri-calcium aluminate, a type which has long been recognized as resistant to sea water and alkalis, but not much used because it is difficult to manufacture. However, one of the companies supplying cement manufactures it very successfully and it is being used on both bridge jobs. There is another type of cement designed to resist sea water which is very high in silica. But this silica is not burned into the clinker, it is added as a puzzolanic material and ground with the clinker. This is manufactured by other companies in the Bay district. Such a cement was not admissible under the original cement specification, but the board of consulting engineers of the Bay Bridge changed the specifications to admit it.

Cements with added puzzolanic materials to provide a defense against sea water disintegration have not been much used in the United States to any extent, but in Europe such use seems to be a fairly settled practice.

In order to admit such cements and low-heat cements, the cement specifications were changed in part to read as follows: "The percentage of tri-calcium aluminate shall not exceed 8% by weight" (this being because research had shown tri-calcium aluminate to

Left: Units which pump the concrete to fill a caisson. Right: Aggregates belt. The flat pulley was found necessary at this point to hold material at high speed

be high in those cements which evolved heat rapidly.

Also, "A modified portland cement complying with all of the above conditions (meaning those of the A. S. T. M. standard specifications) except for the percentage of insoluble, where the decrease in solubility results from the addition of a siliceous material to bring about a greater degree of hydration and consequent resistance to the deteriorating effect of sea water, may be used.

"Provided, the composition and manufacture of such modified cement is first approved by the chief engineer of the bridge."

These changes in the specifications were attacked in the newspapers and also in the courts. But the engineers have a great deal of data on the behavior of different types of cements in sea wall and bridge construction exposed to the waves and tides of the Pacific, in addition to the results of research carried on in their own laboratories and by authorities in the universities of the state and elsewhere to guide them. It is the writer's belief that no changes would have been made without the soundest engineering and scientific reasons for making them.

Cement Standard

Of course the greater part of the cement in the structure will be standard portland cement conforming in every way to the standard A. S. T. M. specifications. It will be furnished by all the companies in the Bay district. The cements designed to resist the action of sea water will be used only in the more exposed portions.

Aggregate Specifications

The grading requirements for aggregates were made by the state's engineers from their long experience in purchasing highway concrete aggregates and a full knowledge of what could be produced from the available deposits. The grading limits for the coarsest aggregate used are:

Round opening	% Passing
3-in.	100
2½-in.	90–100
2-in.	45– 65
1½-in.	0– 10

For 1½-in. maximum coarse aggregate:

Round opening	% Passing
1½-in.	90–100
¾-in.	55– 75
No. 3 (0.263-in.)	0– 10

For pea gravel:

Mesh	% Passing
½-in. round	95–100
No. 3	50– 80
No. 30	0– 10

For fine aggregate:

Mesh	% Passing
No. 3	90–100
No. 10	55– 80
No. 20	30– 55
No. 30	20– 35
No. 40	10– 25
No. 80	0– 10
No. 200	0– 3

In addition to this the fine aggregate grading specification says: "Size composition of the fine aggregate shall be uniform within the tolerance of the above screen analysis and the grading curve, when plotted on the standard grading chart shall have the same general direction and shape as the grading curve of the other aggregates with which it is combined."

The standard (California) grading chart mentioned is a distorted form of the logarithmic chart, arranged so that a standard grading plots as a straight line. It is quite misleading to one who is not used to it, so it is not reproduced here. Note that the sand grading in the above example falls easily within the limits for fine aggregate grading.

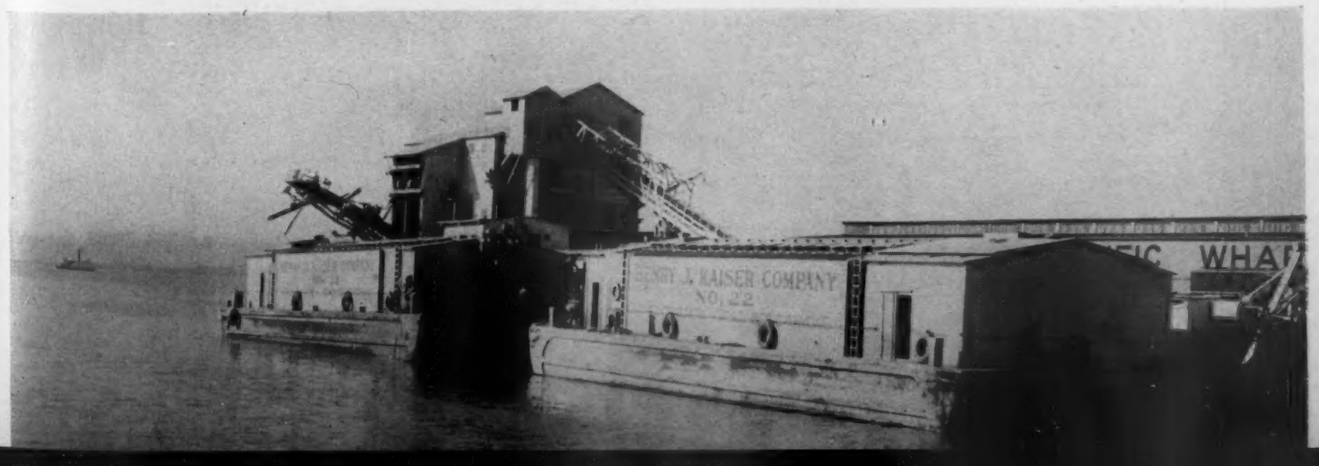
Other important features of the fine aggregate specification are: "The total passing 10-mesh and retained on 30-mesh shall not exceed 50%. . . . Fine aggregate may be furnished in two sizes at the contractor's option. . . . Blending with stone chips or crushed material is not permitted. . . . Not more than the difference between 6% and the loss determined by decantation shall pass 100-mesh."

Use of Fine Sand

It was thought at first that the greater part of the concrete placed would contain six sacks per cubic yard, the concrete mix which has been practically standard in the highway and bridge work put in by the State of California. But research with the materials available disclosed that a workable concrete could be made with the same water-cement ratio, having only five sacks to the yard, providing the grading was held to the curve adopted. The exception to this was the "tremie concrete," which, as has been explained, must be more mobile for the same water-cement ratio. With the 5-sack mix there is a gain in density, and of course the saving of a sack of cement per yard is no small matter.

The 5-sack concrete is workable "as is," especially with the internal vibration method of placing used. But it is not so workable as a concrete with more fines. For this reason the contractors have been permitted to use some fine sand to replace the fines lost by using five instead of six sacks per yard. The advisability of doing this was worked out by the state's engineers and the concrete thoroughly tested. By the *correct* use of fine sand (the word is emphasized because no more than enough fine sand should be used) mixes containing four, five and six sacks per yard were made, all with the same water-cement ratio. Tests showed the 5-sack mixes to be stronger, slightly, and to be more desirable in other ways than either the 4- or 6-sack mixes. (*Next page*)

Batching plant and barges. Note boom conveyors over barge



The writer was much interested to learn this, for it confirms a belief which he has long held and has published. It is that once the best grading that can be made with the available aggregates has been found, the way to reduce the cement in the concrete is not to crowd as much coarse aggregate into the mixture as possible; it is to replace a part of the cement with fine sand or other suitable material.

Apparently few engineers and not many laboratory investigators thoroughly appreciate the part that the sand fraction passing 30-mesh plays in determining the strength and workability of concrete. Mr. Hands says that even he was surprised to find how much slight changes in this fraction affected the mix, when he was making special tests to determine the effects of varying the grading of the sand.

Batching Plant and Mixer Barges

The batching plant of the Henry J. Kaiser Co. has so many new and interesting features that to describe them all would make a long story in itself. So only the main features will be set forth here. It is housed in a large building at the end of a wharf of Oakland Mole, the Southern Pacific terminal and ferry port in Oakland. There are five railroad tracks on the wharf to accommodate the trains that bring in materials, and the wharf also receives shipments made on barges.

Near the land end of the wharf are track hoppers under three tracks into which the cars of aggregate are discharged. From these the aggregates are taken on a 30-in. cross belt conveyor, a 42-in. conveyor belt, of something over 400 ft. centers, which delivers to the silos. It is said to be the longest conveyor on the Pacific Coast. It was designed and installed by the Bodison Co., San Francisco, using Link-Belt troughing rolls and idlers, and it is a beautiful job, running steadily and smoothly. This company furnished most of the equipment of the batching plant except the scales.

The conveyor discharges in the center of a short shuttle conveyor on a turn table. It can be turned on its center so that either end can discharge into one of the silos that store the aggregates, and as the motor which runs it is reversible either end may be made the discharge end. The arrangement saves head room and the greater length of belt that would be required if the aggregates were to be discharged to a central point and then distributed to the silos through spouts. It also prevents segregation in the bunkers or silos.

Aggregates which are brought in by barges have to be unloaded to the track hoppers by locomotive crane. One quarry operator ships its product in a special self-unloading barge that has a belt feeding an elevator that lifts the product high above the wharf so that it may be loaded into cars if desired. Maximum batching necessitates barge to car loading since the barge cannot be reloaded fast enough. The barge unloads to cars while other material is being unloaded.

Only bulk cement is used. That by rail is discharged from cars to a track hopper by means of a scraper. A screw conveyor carries it under the wharf to an enclosed bucket elevator that discharges to a screw conveyor running over the cement storage silos. The cement delivered by water comes in special barges which have two parallel cement hoppers with V-bottoms running longitudinally of the barge. These discharge to a conveyor belt that in turn discharges to an enclosed elevator which lifts the cement to the track hopper mentioned.

The silos are, of course, arranged so that they feed directly into the weigh hoppers of the Kron multiple-beam batching scales. There are two of these for aggregates and two for cement. One of the cement scales has the "electric eye" method of cutting off the flow to the weigh hopper, the others all have the jump spark method. Both methods have the same effect, that of shutting off the heavy flow to the hopper before the full amount is fed, and completing the amount by shaking in a little at a time until the exact weight, almost to the pound, is in the hopper.

The batches go to the mixer barges by the boom conveyors that may be seen projecting from the side of the building. Each barge has pockets for 36 batches. They show in the picture of the wharf with the barges lying beside it.

The entire batching system is so interlocked and provided with safeguards that it is impossible for the operator to make a serious mistake. In the first place, batches cannot be weighed until the hopper of the scales is empty. Next the batches have to be weighed in order, sand, No. 1 rock, No. 1-A rock and No. 2 rock, and then the cement, which is weighed on its own scale. The weighing is done by a man who sits at a desk before a row of push buttons of different colors which he pushes in order. But if he should happen to push the wrong one nothing would happen because of the way the system is interlocked. If the electric controls should get out of order there is a set of pneumatic controls which is always ready.

Every batch weighed is recorded both as to time and the separate weights of the different ingredients on a traveling strip, and this strip constitutes a complete record of the work that is done in the plant.

There are two 3½-yd. mixers on every barge. They receive the batched materials from belts that are fed by gravity from the pockets and deliver them above the mixers. The mixed concrete runs out of the mixers on a belt that delivers it to a boom conveyor that places it in the hopper from which the buckets are fed or to an agitator tank in the place where the concrete is pumped.

This job is so big and is spread out over such a distance and embodies so many new things that it has not been possible to describe more than what seems to the writer to be of the greatest interest to Rock Products readers. There are many engineering features that are so novel or otherwise interesting that he wishes he had the space to describe them. For example, there is the polishing, not merely finishing, of the concrete on which the bed plates of the big steel towers will be placed. And these bed plates will be carefully machined to insure an even contact, and an even distribution of the load all over the base. This is only one of many things that show the care, skill and results of long experience that are going into this work.

While the orders for the concrete have been placed with the Kaiser company, the actual placing of the concrete is done by the main contractors. The concreting system was developed by the Kaiser company, of which A. B. Ordway is general manager and H. P. Davis in charge of plant design.

The bridge is being built by the California Toll Bridge Authority, all in charge of Charles Purcell, chief engineer of the bridge department of the division of highways, and C. E. Andrews is bridge engineer in charge of construction. Glen Woodruff is the designing engineer.

New Use for Lime in Water Purification

RECENTLY it has been established that mottled teeth are caused by drinking water containing fluorides. Two cities have discarded their water-supplies in favor of others containing less fluorides. The subject is discussed at some length by C. S. Boruff, State Water Survey, Urbana, Ill., in the January issue of *Industrial and Engineering Chemistry*. A summary of his article is:

Removal of injurious quantities of soluble fluorides from drinking waters can be accomplished by dosing with alum, with subsequent removal of the floc by sedimentation and filtration. Under certain conditions contact beds of activated alumina or some other aluminum compound that may be developed for this purpose may prove feasible. Softening, with the addition of excess lime, causes the co-precipitation of considerable fluoride. The extent of the above treatments will depend on the fluoride concentration in the raw water and the amount of fluorides which will ultimately be established as the toxic limit allowable in water supplies. A practical demonstration of fluoride removal at some water treatment plant equipped with settling basins and filters would be of great value.

Mr. Boruff points out that lime not only serves as a water softener, but is helpful in removing fluorides. He says, specifically, in regard to the use of lime: "Treatment of stock waters with sufficient calcium hydroxide to cause precipitation of the carbonate and magnesium hardness and produce a phenolphthalein alkalinity which was equal to or slightly greater than half the total, brought about co-precipitation of part of the fluorides present.

Capacity of the Cement Industry

By H. Herbert Hughes,
Washington, D. C.

THE Code of Fair Competition for the Cement Industry contains the following section:

"Prior to the construction or operation of a new plant, or the increase in the productive capacity of an existing one, or the movement of all or part of such a manufacturing plant from one plant to another, The Cement Institute, on receipt of such information, shall promptly collect complete information concerning existing productive capacity in the area in which the proposed new plant is to be located, together with data concerning consumption of cement in that area. If these data disclose that such new plant will result in further increasing the problem of overproduction or over-capacity in such area, The Cement Institute may petition the President of the United States to prohibit the construction, or operation, of the proposed new plant or the increase in manufacturing capacities of such existing manufacturing plants. The provisions hereof shall not be construed to prevent modernization of existing plants to improve quality of product and/or operating efficiency."

Opposition to this provision centered chiefly around representatives of a company now building a plant, but several persons who testified raised the question of an equitable method for determining the capacity of the cement industry and recommended that a survey be made by an unbiased agent. A wealth of basic data relating to the problem already exists.

Bureau of Mines Collects Capacity Figures

For several years the U. S. Bureau of Mines has asked each manufacturer of cement to report annually "the total quantity of *finished cement* your plant could have produced during the past year, allowing for ordinary and usual interruptions and assuming a continuous demand, an adequate fuel supply, and favorable labor and transportation conditions." Replies to this question are tabulated by B. W. Bagley, whose long experience as cement statistician virtually eliminates the possibility of errors through misinterpretation of the data as received. Responsibility for discrepancies lies with the operators. The psychological effect of boom years may have been reflected in a tendency toward exaggeration on the part of the manufacturers. Furthermore, several plants, inactive for years, still are included in the capacity figures reported by their respective companies.

Salient statistics relating to the producing capacity of the cement industry from 1925 to 1932 are summarized in Table 1. The first column shows the capacity figures of the industry as tabulated from reports of individual companies. Actual production of both finished cement and clinker also are shown along with their percentage relationships to capacity. Of particular significance is the fact that the percent of capacity utilized was dropping as early as 1926, whereas production increased each year until 1929. From 1925 to 1932 the producing capacity of the cement industry increased more than 40%, while production of finished cement dropped nearly 53%.

Expressed in terms of percentage of capacity utilized, production of finished cement in 1925 amounted to 83.5% of the estimated capacity and only 28.2% in 1932.

Production of clinker parallels closely production of finished cement from 1925 to 1932, but the quantity each year is slightly less. This, of course, is expected because gypsum is added to the clinker upon grinding. Further discrepancies in relationships may be accounted for by variations in stocks of both clinker and finished cement.

Clinker Production Is Bottle-Neck

Clinker production usually is the neck of the bottle in calculating the capacity of a cement mill. Many plants are designed with grinding facilities in excess of clinker producing capacity in order that unforeseen peak demands may be met from clinker stocks. Peak demands commonly are supplied also from stocks of finished cement built up during slack months. Storage facilities therefore play an important part in determination of maximum producing capacity, but their evaluation is a story in itself to be discussed in another article.

Table 1 also gives hypothetical statistics of production based upon certain assumptions of uniform operation. As an illustration of the relationships indicated by these data, let us consider 1928, the year of peak production. Actual production of finished cement in 1928 amounted to 176,299,000 bbl., or 72.3% of capacity, and production of clinker 71.3% of the same capacity figure. August was the peak month of clinker production in 1928, 16,202,000 bbl. of clinker having been produced. Although cement kilns are in continuous use when the plant is in operation, shutdowns for repairs are necessary regardless of market conditions. For this reason, 11-months operation is about the maximum that can be expected for any mill. Of particular significance is the fact that 11-months production of clinker in 1928 at the rate of the peak month would have amounted to only 181,159,000 bbl., representing 73.1% of alleged capacity. This is an increase of 1.8% of capacity over actual clinker production.

On the further assumption that the peak output for one month might represent a production schedule that could not be maintained over a longer period, 11-months' production of clinker at the rate of the average for the 3 peak months of 1928 has been calculated. This figure amounts to 178,515,000 bbl., only slightly below the calculation based on peak month production. Comparison of the figures for other years indicates a similar close relationship between peak-month production and an average for 3 peak months. It seems, therefore, that the peak-month production of clinker is an accurate indicator of what the cement industry might have done during any year, assuming the existence of adequate storage facilities.

Production of clinker for 12 months at the rate of the peak month also is given for

Editor's Note

THE CHIEF VALUE of this article is that it shows there is more than one way of estimating "the capacity" of the cement industry, or any industry, for that matter.

For example, 1928 was the peak year of portland cement production, and August was the peak month in that year. Assuming that all available equipment was in use that month for making clinker, and that the same rate of production had been maintained for 11 months, only 181,159,000 bbl. of clinker could have been produced, Actually 176,299,000 bbl. of finished cement was made.

Was the real capacity of the industry in 1928 about 181,000,000 bbl., with 97% of this capacity utilized, or was the capacity 243,702,000 bbl., as reported by individual manufacturers to the Bureau of Mines, with only 72.3% of this alleged capacity utilized?

The Cement Institute has already reduced its estimate of capacity from that reported to the Bureau of Mines 7½%, or from 271,850,000 to 251,400,000 bbl. annually. This, presumably, merely by elimination of plants more or less permanently abandoned during the last two years.

No account is taken of cost of production in these estimates. With cement prices fixed at a point commensurate with possibilities under NRA supervision it is apparent that more mills will be eliminated by inability to keep cost below net selling price.

Obviously, "capacity of the industry" will require a much more explicit definition than any yet applied, and when the figure is scientifically and judiciously arrived at, it probably will be considerably below the one at present used.

TABLE I.—SUMMARY OF SALIENT STATISTICS RELATING TO PRODUCING CAPACITY OF THE PORTLAND CEMENT INDUSTRY, 1925-1932[1]

Year	Capacity (000) Barrels	Production of Finished Cement (000) Barrels	Production of Finished Cement Percent of Capacity	Production of Clinker (000) Barrels	Production of Clinker Percent of Capacity	11 Months Production of Clinker at Rate of Average for 3 Peak Months (000) Barrels	11 Months Production of Clinker at Rate of Average for 3 Peak Months Percent of Capacity	11 Months' Production of Clinker at Rate of Peak Month[2] (000) Barrels	11 Months' Production of Clinker at Rate of Peak Month[2] Percent of Capacity	12 Months' Production Clinker at Rate of Peak Month (000) Barrels	12 Months' Production Clinker at Rate of Peak Month Percent of Capacity
1925	193,558	161,659	83.5	160,098	82.7	165,004	85.2	O 168,564	87.1	182,808	95.0
1926	215,300	164,530	76.4	163,464	75.9	171,182	79.5	O 172,920	80.3	188,640	87.6
1927	227,080	173,207	76.3	169,788	74.8	178,915	78.8	O 181,159	79.8	197,629	87.0
1928	243,702	176,299	72.3	173,742	71.3	176,759	72.5	A 178,222	73.1	194,404	79.8
1929	258,917	170,646	65.9	168,988	65.3	171,556	66.3	A 174,119	67.2	189,948	73.4
1930	270,044	161,197	59.7	160,992	59.6	175,065	64.8	M 182,677	67.2	199,284	73.8
1931	271,850	125,429	46.1	121,814	44.8	139,645	51.4	M 144,749	53.2	157,908	58.1
1932[3]	271,850[4]	76,509	28.2	75,004	27.6	80,817	29.8	S 84,733	31.2	92,436	34.0

[1]All data are taken from reports by B. W. Bagley, U. S. Bureau of Mines. [2]The peak month is designated by the initial preceding the quantity: O—October, A—August, M—May, S—September. [3]Figures for 1932 are subject to revision. [4]Capacity figure at the end of 1932 not yet published.

each year, but these figures are purely hypothetical, as no mill is able to operate without an occasional shutdown.

Table 2 is a recapitulation of the relationships between actual production of clinker and the hypothetical figures. Even during the last three years of declining markets, production of clinker has approximated the calculated figure of 11 months' production at the rate of the peak month.

Capacity Relationships Set Up

Arriving at an equitable capacity figure for the cement industry becomes more involved when attempts are made to allocate capacity by districts. Several years ago the U. S. Bureau of Mines established 12 districts for statistical purposes, and these same districts have been adopted by the Cement Institute in the Code of Fair Competition for the Cement Industry. Fig. 2 shows the 12 districts and their relative importance. The total area of each circle represents the total producing capacity of the district as reported by the Bureau of Mines at the close of 1931. The black sectors show the percentage of capacity utilized in each district as expressed by production of finished cement in 1932. Considerable variation in so-called "excess capacity" exists among the 12 districts.

Summary of Capacity Figures

Available capacity figures are summarized in Table 3. Column 1 shows capacity by districts as reported by the manufacturers to the Bureau of Mines at the close of 1931. Few important changes have been made in capacity of existing mills since that time, and no new mills have begun operation. A capacity canvass of manufacturers at present, therefore, doubtless would result in similar totals unless definite rules were established to govern replies to the questionnaires. Column 2 shows the precent of total capacity represented by each of the 12 districts. No. 1, which includes the well-known Lehigh district, is the largest, with 20.8% of the total; No. 10, the Rocky Mountain States, comprises only 2.5% of the total. The third column gives the percentage of capacity in each district represented by the average production of clinker for the 5-year period, 1928-32. For the entire industry this amounted to 51.8% of the total capacity figure, and by districts it varied from a low of 32.7% in District 10 to a peak of 57.8% in District 7.

Statistics of capacity compiled by the Cement Institute for use in the Code of Fair Competition presented to NRA are shown in column 4. The total capacity recognized by the Institute is 251,400,000 bbl. a year, a drop of 7.5% from the comparable Bureau of Mines figure. The percentages of variation of the two sets of figures are shown in column 13. District 7 is scaled downward only 2.2%, but the Institute figure for District 10 is 19.3% below the Bureau of Mines' figure. Declines for the other districts vary between those limits, the weighted average drop being 7.5%. The percentages of these capacity figures, represented by the average clinker production for 5 years, are shown in column 6.

A series of capacity figures calculated more or less arbitrarily from peak-month production records are given in column 7. The peak year of cement production was 1928, and in general this year is taken as the basis for the calculations. For the entire cement industry, however, production of clinker in October 1927 was higher than for any month during 1928. Eleven-months' production of clinker at the rate of the output for October 1927, plus the actual increase in capacity reported by the Bureau of Mines from 1927 to the end of 1931 is set up as an arbitrary capacity figure for the industry. A similar procedure was followed to determine a capacity figure for each district. In some instances the logical peak month to use for computation occurred in 1930, or even 1931, in which event little or no additional capacity to the end of 1931 could be added. These districts typically show a relatively high percentage of capacity utilized, as expressed in column 9.

TABLE 2.—PER CENT OF HYPOTHETICAL PRODUCTION FIGURES REPRESENTED BY ACTUAL PRODUCTION OF CLINKER, 1925-1932[1]

Year	11 months production at rate of average for 3 peak months Pct.	11 months production at rate of peak month Pct.	12 months production at rate of peak month Pct.
1925	97.0	95.0	87.6
1926	95.5	94.5	86.7
1927	94.9	93.7	85.9
1928	98.3	97.5	89.4
1929	98.5	97.1	89.0
1930	92.0	88.1	80.8
1931	87.2	84.2	77.1
1932	92.7	88.5	81.1

[1]Calculated from reports by B. W. Bagley, U. S. Bureau of Mines; for example, in 1925 the actual production of clinker was 97.0 per cent of a hypothetical 11-months production at the rate of the average for 3 peak months, 95.0 per cent of 11-months production at the rate of the peak month, and 87.6 per cent of 12-months production at the rate of the peak month.

No correction factor for the addition of gypsum has been used because the problem is more to determine the relationships existing among the various districts than to set up rock-bound capacity figures. Applying this formula (11 months' production at the rate of the peak month), 225,900,000 bbl. a year is established as the capacity of the cement industry. This represents a decline of 16.8% from the Bureau of Mines figure—a fact of little significance because of the arbitrary calculation involved. Of particular significance, however, is the relation among the percentages of decline by districts shown in column 14. District 1 is affected least, dropping only 4.4%, while District 10 again shows the greatest decline, 39.8%.

In column 10 the same total capacity figure of 225,900,000 bbl. a year is used, but allocation of productive capacity by districts is on the basis of average production of clinker from 1928 to 1932. This procedure causes even further fluctuation in percentages of total capacity shown in column 11 from comparable figures in columns 5 and 8. The percentage of capacity represented by the 5-year average of clinker production, of course, remains constant for all districts, at 62.0%. According to column 15 this method of establishing capacity by districts results in the least change from Bureau of Mines' figures in District 7, and District 10 again shows the greatest decline.

Column 16 is strictly hypothetical but nevertheless significant. In it the districts are ranked according to the average percentage declines of columns 13, 14, and 15. District 10, showing the greatest decline in all three columns, is in the first position, the significance being that any capacity study probably will have a greater effect on the Bureau of Mines' figure for District 10 than upon any other district. In like manner,

TABLE 3.—CAPACITY STATISTICS OF THE PORTLAND CEMENT INDUSTRY, BY DISTRICTS

	Reported by the Bureau of Mines at the close of 1931[1]			Compiled by the Cement Institute[2]			Calculated from peak month production of clinker[3]			Allocation by districts based upon average annual production of clinker, 1928-1932[4]						
	Annual capacity (000) barrels	Per cent of total	Per cent represented by average annual production of finished cement 1928-1932	Annual capacity (000) barrels	Per cent of total	Per cent represented by average annual production of finished cement 1928-1932	Annual capacity (000) barrels	Per cent of total	Per cent represented by average annual production of finished cement 1928-1932	Annual capacity (000) barrels	Per cent of total	Per cent represented by average annual production of finished cement 1928-1932	Variation of Cement Institute figures from Bureau of Mines capacity. Per cent change of column (7) from column (1).	Variation of peak month calculations from Bureau of Mines capacity. Per cent of change of column (7) from column (1).	Variation of allocation by 5-year averages from Bureau of Mines capacity. Per cent change of column (10) from column (1).	Rank of districts in the order in which capacity revisions are likely to affect most seriously Bureau of Mines figures, based on average of columns (13), (14) and (15).
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
United States, total..	271,850	100.0	51.8	251,400	100.0	55.7	225,900	100.0	62.0	225,900	100.0	62.0	— 7.5	—16.8	—16.8	..
District 1.....	56,380	20.8	54.5	54,100	21.7	56.8	53,900	23.9	56.8	49,800	22.0	62.0	— 4.0	—11.7	—11.7	12
District 2.....	19,009	7.0	53.2	16,800	6.7	60.0	17,300	7.7	58.5	16,200	7.2	62.0	11.6	— 9.0	—14.8	7
District 3.....	28,863	10.6	48.3	26,100	10.4	53.6	22,400	9.9	61.9	22,600	10.0	62.0	— 9.6	—22.4	—21.7	5
District 4.....	19,235	7.1	51.1	16,900	6.7	58.2	15,800	7.0	62.0	15,800	7.0	62.0	—12.1	—17.9	—17.9	6
District 5.....	31,393	11.5	57.2	30,300	12.0	59.2	24,700	10.9	72.6	28,900	12.8	62.0	— 3.5	—21.3	— 7.9	8
District 6.....	27,021	10.0	44.3	24,400	9.7	49.0	22,400	9.9	53.3	19,200	8.5	62.0	— 9.7	—17.1	—28.9	4
District 7.....	24,242	8.9	57.8	23,700	9.4	59.0	20,100	8.9	69.7	22,600	10.0	62.0	— 2.2	—17.1	— 6.8	10
District 8.....	18,330	6.7	55.1	17,700	7.0	57.0	15,400	6.8	65.5	16,200	7.2	62.0	— 3.4	—16.0	—11.6	9
District 9.....	10,579	3.9	56.8	10,200	4.0	58.9	9,500	4.2	63.2	9,700	4.3	62.0	— 3.6	—10.2	— 8.3	11
District 10.....	6,812	2.5	32.7	5,500	2.2	40.5	4,100	1.8	54.4	3,600	1.6	62.0	—19.3	—39.8	—47.2	1
District 11.....	22,405	8.2	44.8	19,100	7.6	52.5	15,600	6.9	64.1	16,300	7.2	62.0	—14.8	—30.4	—27.2	3
District 12.....	7,581	2.8	39.9	6,600	2.6	45.8	4,700	2.1	64.5	5,000	2.2	62.0	—12.9	—38.0	—34.0	2

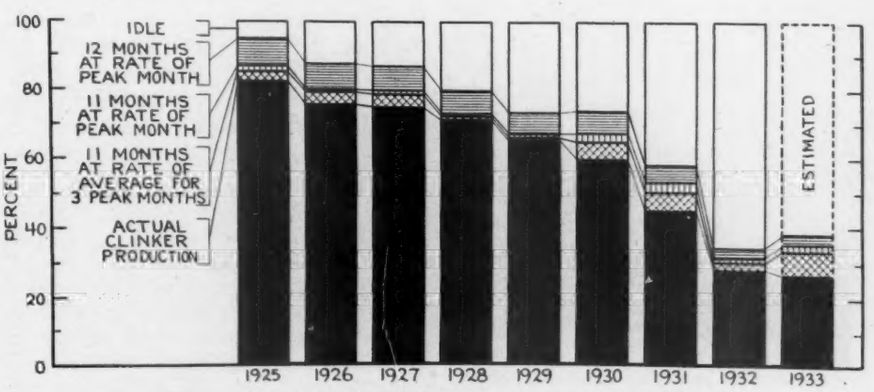
[1] From reports by B. W. Bagley, U. S. Bureau of Mines. [2] As used by the Cement Institute in the proposed Code of Fair Competition for the Cement Industry. [3] Compiled by calculating 11-months production of clinker at the rate of the peak month since 1927 and adding any increased capacity reported since that year. [4] Assuming the total capacity of column 7, district capacities are allocated on the basis of the average annual production of clinker for five years, 1928 to 1932.

District 1 is likely to be affected least. It must be remembered that this ranking can not be interpreted literally, but general relationships probably will hold true in any revision of capacity figures for the cement industry.

Importance of Stocks

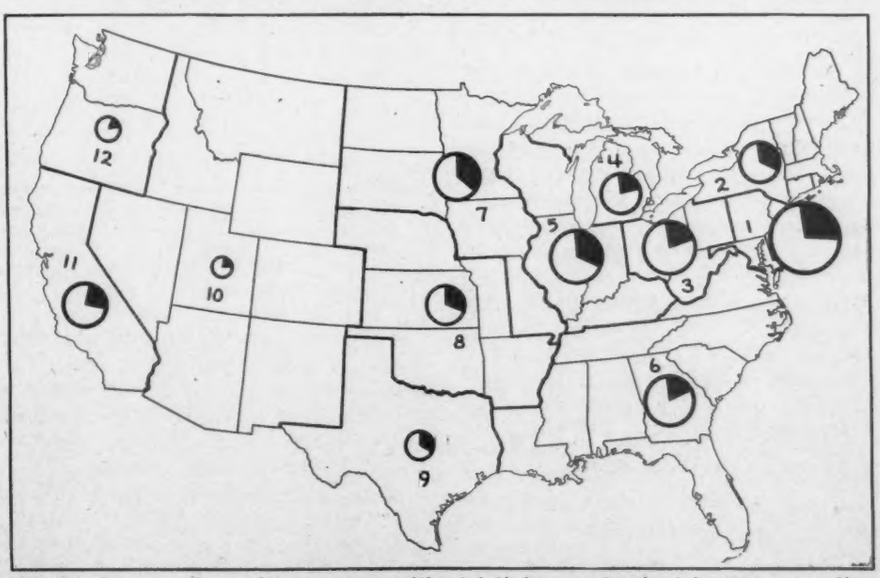
Consideration of peak-month production of either clinker or finished cement in calculating hypothetical operating schedules for the cement industry must be based on the assumption that storage facilities are adequate to build up reserves to meet demands during the height of the construction season. Any deficiency in storage facilities must be met by reserve productive capacity in anticipation of a high seasonal peak. For example, if a mill having no storage facilities expects to ship 100,000 bbl. of cement during any one month, it must manufacture cement during that month at the rate of 1,200,000 bbl. a year. If its rated capacity also is 1,200,000 bbl. a year, it can not be stated accurately that the excess capacity of the mill amounts to 50%, even though total shipments throughout the 12-months' period may have amounted to only 600,000 bbl., because the full capacity is required during the month of peak shipments.

On the other hand, a mill having an annual capacity of 600,000 bbl. a year theoretically could meet a demand of 600,000 bbl., including a midsummer peak of 100,000 bbl. a month if its physical equipment included provision for adequate stocks to take care of seasonal fluctuation in shipments. Both examples are extreme, but they illustrate principles which must be taken into consideration in any thorough study of the capacity of the cement industry.



Above: Relation of production and capacity 1925-1933

Solid black shows actual clinker production. The other three patterns represent conditions which would have existed if certain hypothetical production schedules had been maintained



Productive capacity and percentage utilized (clinker production) in 1932, according to Bureau of Mines figures

A Brief Survey of Admixture Patents

By W. E. Haskell,
Oakland, Calif.

THE CEMENT CHEMIST is, in general, but little concerned with the manner in which his product is used; his efforts being largely confined to the production of a cement meeting or exceeding the standard specifications. In some cases where admixtures are added to the cement at the mill the chemist is, of course, well informed on their nature and effects; but the number of proposed and actually used admixtures are surprisingly large, and it is thought that a brief survey of this class of materials might be of interest to the cement plant chemist.

The search for, and investigation of substances to modify and enhance the normal properties of cement and concrete is probably as old as the industry itself, and the optimistic hopes of many inventors has resulted in numerous patents covering the use of such a mass of heterogeneous materials, that years of investigation would be required to pass upon the validity of their claims.

Some of the admixtures in use are without doubt of value and it is not the purpose of this paper to attempt a critical discussion of them, but an attempt has been made to survey some of the patents of the years 1922-1931 and to list and classify some of the substances recommended therein for use in cement and concrete.

The term admixture as used in this paper, is any substance which is added to the cement during the process of manufacture, or to the mixture of cement, water and aggregate of the concrete, and excludes those substances used as a surface coating to prevent water penetration.

Many of the patents cover admixtures used to produce a light weight porous concrete and some of these substances have been included in the tables. In general the properties of the cement and concrete claimed to be effected by admixtures are as follows:

Compressive and tensile strength.
Plasticity.
Workability.
Impermeability.
Resistance to water penetration.
Color.
Porosity.
Accelerated set and hardening.
Wear and abrasion.

Patents covering the use of such well-known materials as the chloride and hydroxide of calcium, diatomaceous earth and other well-known and exhaustively tested materials are numerous, but the literature likewise discloses various substances, the use of which would be viewed with grave misgivings by the chemist or experienced concrete technologist. Examples of such materials are sugar and tannin.

It may be said that many of these generally accepted harmful substances are used in combination with others, hence it is possible for their deleterious effects to be masked or cancelled.

The following tables are of substances recommended as admixtures taken from patents of the years 1922 to 1931 and in addition some of the patents are listed.

A fairly wide experience in the chemistry and technology of concrete and cement has convinced the writer that in many cases the use of admixtures is superfluous, as it is

Elements	Oxides	Hydroxides	Chlorides	Sulfates	Carbonates	Nitrates
Al	Cr	Al	Al	Al	Ca	Al
Ca	Fe	Ca	Ba	Ba	K	Ba
Fe	Mn	Fe	Ca	Ca	Mn	Ca
Zn		Li	Hg	Fe	Na	Sr
		Na	Mg	K		
		K	Na	Na		
			K	Mg		
			Ti			
			Sn			
			Sr			

Silicates	Aluminates	Borates	Sulfides	Miscellaneous
Al	Ca	Ba	Ca	Sodium thiosulfate
K		Na		Potassium permanganate
Na				Potassium chromate
				Potassium dichromate
				Potassium ferro-cyanide
				Potassium ferri-cyanide
				Alum

Inorganic Acids	Organic Salts	Organic Acids
Arsenious	Al naphthenate	Abietic
Boric	Al stearate	Benzoic
Fluosilicic	Ammonium caseinate	Lysalbinic
Hydrochloric	Ca stearate	Oxalic
Silicic	Cellulose acetate	Protalbinic
Tungstic		Stearic

In addition are specified soaps of the alkali and alkaline-earth metals.

Miscellaneous Organic Substances

Mineral oil	Cellulose	Resin
Sulfonated oil	Tannin	Pitch
Bitumen	Sugar	Glue
Paraffin	Soap	Colophony
Kerosene	Algin	Lard
Asphalt	Casein	Linseed oil
Coal tar	B-naphthol	Rosin
Tar coke	Rubber	Tallow
	Rubber latex	Cocoanut oil
	Gum arabic	Soy bean protein

Natural Products and By-products

Kieselguhr	Bentonite
Diatomaceous earth	Shist
Gypsum	Oil bearing shale
Pozzolana	Carborundum
Clay	Ice
Mail	Cinders
Slag	Asbestos

PATENTS PERTAINING TO ADMIXTURE

United States

1,814,292	1,755,502	1,599,903
1,807,810	1,755,638	1,589,650
1,805,104	1,737,006	1,578,139
1,803,557	1,650,864	1,550,355
1,793,148	1,644,964	1,530,533
1,791,704	1,644,965	1,519,285
1,791,630	1,633,790	1,519,286
1,791,820	1,623,989	1,471,410
1,782,471	1,618,512	1,436,276
1,760,214	1,610,864	

British

338,242	305,415	252,210
334,053	301,509	250,625
332,604	298,943	244,973
329,291	291,988	244,603
325,991	262,294	242,345
310,875	253,963	240,041
		240,386
		217,279
		193,829

French

703,437	669,353
701,006	666,763
698,422	665,005
698,520	662,145
697,127	655,484
695,079	647,259
695,099	
694,287	
684,906	

German

527,756
528,807
512,876
501,842
496,958

Japanese

89,612
40,368
40,198
39,705

Canadian

247,397
226,350

Swedish

56,794
52,563

Swiss

127,975

very seldom that the use of an admixture will permit the use of less cement, and it is believed that with the more expensive admixtures, that the admixture could with profit be replaced with more cement. The hydraulic property of the cement itself is unique, but specific instances do present themselves in which a well studied admixture is of advantage.

It is apparent, however, in view of the almost endless combinations of the substances listed, that a great deal of experimental work remains to be done before the engineer or builder may view the use of many admixtures with confidence.

Recent Cement Patents

(Reviewed by Edmund Shaw)

A STUDY of recent patents relating to portland cement shows something of how those interested believe that the product can be improved or a better product be made in its place. At the same time patents really tell little of the research that is going on, and no patent in these days is to be taken too seriously. Too often a patent is taken out with the idea of cutting off further work along a certain line, and in other cases it is taken out for the same reasons that a man plays a 100 to 1 shot at a horse race. It does not cost much and it might be worth something.

For this reason some patents have been omitted and only those which seem to promise something are considered here. About a third relate to high-early-strength cements. Steinhour (Patent No. 1,856,442) offers a variation on the ordinary double burning method. He makes a clinker with a mix so high in lime that a considerable part of the lime is free. This is ground and clay, with the necessary silica, iron and alumina, is added and the mixture is sent back to the kiln. He claims to gain many advantages over the other double burning methods, including a very high tricalcium silicate content. This patent is assigned to the Riverside Cement Co.

Lundteigen (1,794,526) makes a clinker which has 5% more lime than the "normal" portland. This is ground to about 78% through 200. It is then mixed with 0.9% sodium chloride and 0.1% calcium chloride and 0.15% of aluminum stearate and 0.5% of quicklime, which is to absorb water and any free CO_2. This is then ground to 95% passing 200. The inventor says that this makes a cement which has a 1-day strength comparable with the ordinary 28-day strengths, and he gives the figures to substantiate it; 330-lb. tensile strength for the usual 1:3 mortar test at 1 day, for example. This patent is assigned to the Ash Grove Lime and Cement Co.

Larmcur and Pierce (1,859,926) claim to make a high-early-strength cement which has a very high plasticity by their method of treating ordinary cement clinker. This consists in cooling the clinker in the absence of oxygen, and to make sure of this absence they introduce a reducing agent such as oil or powdered coke. This would seem to necessitate a somewhat more complicated cooling system if any heat is to be recovered from the clinker. The patent is assigned to the Yosemite Portland Cement Corp.

These patents do not contemplate any serious departure from the ordinary practice and equipment of a portland cement mill. But the patent of a French woman, Mme. G. Lepine, calls for a new type of kiln and new practice. Her process consists in burning the usual cement raw materials in an atmosphere which is watery and reducing and in the presence of an alkali. These conditions are best fulfilled by adding liquid ammonia in small quantities. It is claimed that the temperature of fusion is much reduced in this way and that the cement has high early strength. The clinker has to be cooled in the same atmosphere, and under some circumstances a "tempering" of the clinker in a reducing and watery atmosphere is indicated. The apparatus is simple. An important feature is the circulating of the gases.

A patent which might affect the white cement industry if wholly successful is that of Bergen (1,865,418). As clays for making white cements are scarce, he uses ordinary colored clay and turns the metallic oxides which give the color into practically colorless glass by adding fluorspar and sodium phosphate or fluorspar, sodium phosphate and borax. By another method he turns the metallic oxides to metals and removes them magnetically or otherwise.

Balthasar, an Austrian, (1,844,940) claims that good cements like portland can be made of materials high in magnesia if the burning is at a sufficiently high temperature. He says that at 1450 deg. C. and above the magnesium silicate first formed is decomposed so that the silica will combine with the lime. In this way cements with 5 to 15% of magnesia have been made that have stood up well in service, according to the inventor. So far the process has been worked only in shaft kilns, and only with metallurgical coke as fuel, but it is hard to see why, if the theory is correct, it could not be worked in rotary kilns.

The patent of de Lambert, a Frenchman, (1,834,770) covers the making of ferrophosphorous and alumina cement from bauxite high in iron by adding phospherite to the bauxite and melting in a reducing atmosphere. This is interesting because the patent is assigned to Pierre Zucco, who recently erected a plant for making aluminous cements in Los Angeles. Bauxite pure enough to make alumina cements is scarce in this country and is needed for other manufactures, but bauxites with some iron and silica are fairly common.

Gypsum Mill Opened

THE new plant just completed by United States Gypsum Company started operations recently at Greenville, Miss. The company announced: "Hardboard made at the plant will be shipped in cars along with the various types of company's insulation board, and will be stocked at company's principal plants and warehouses in all parts of the nation."

The new product fits in closely with many other products of this company.

Hints and Helps for Superintendents

Spiral Rectangular Chutes

By Arthur C. Hewitt, M. E.,
Mechanical Engineer, Bellefonte, Penn.

SOMETIMES in designing chutes the layout calls for a spiral segment and nothing else seems to answer. If such a chute is circular in cross section the solution is comparatively easy since pipe bends can be used, but if the chute is rectangular or square it may not be quite so easily solved. Assume, for instance, it is necessary to run a chute around part of a circular tank or bin and slope it downward to convey crushed or pulverized material. If a round chute made from pipe were used it would be a simple matter to bend the pipe into the necessary spiral. But if the ordinary mechanic or millwright were called upon to do this with a rectangular or square chute he would be apt to give up in disgust, make it in several straight sections put together with angular joints, or wind up with a very crude job if he attempted the curved chute.

Having at one time been faced with the necessity of furnishing templates from which to make several spiral square chutes, the writer thought there might be others who would like to know how such chutes can be constructed. I say constructed rather than designed, for to make theoretically correct tops and bottoms for such spiral chutes is not practical unless there are many chutes to be made identically alike, or where the spiral in a single chute makes several turns with a single radius. Even then a cut and try method may be well worth while.

To get a better understanding of the problem let us study a practical example and consider a spirally curved surface such as the bottom of a spiral chute. Assume, for example, that the outer edge is to have a slope of 45 deg. and the outer edge is to have a 60-in. radius in plan view. Now if the inner edge coincided with the vertical center it is readily seen that the inner edge becomes a vertical straight line. Thus we have the extreme condition wherein the outer edge of the plate is a spiral while the inner edge is a straight line. For all practical purposes it is impossible to make such a surface from a piece of flat plate.

Now instead of the inner edge being coincident with the vertical axis, suppose it has a 50-in. radius in the plan view. The plate would then be 10 in. wide in plan and both inner and outer edges are spirals, but not alike. The inner spiral has a slope which is $\frac{50}{60}$ of 45 deg. measured from the vertical, or when measured from the horizontal it would be

$$90 - \left(\frac{50}{60} \times 45\right) = 90 - 37\tfrac{1}{2} = 52\tfrac{1}{2} \text{ deg.}$$

Thus we have a surface that can be fabricated from a flat plate, if not too large a segment is tackled at a time. To make such a segment requires stretching of the inner edge as well as the bending of both edges, so that the resulting segment has a 45-deg. sloped outer edge and a 52½-deg. slope on the inner edge.

The inner and outer side plates are true parallelograms before being bent to the necessary curvature, but the inner one is smaller than the outer one due to the radius of curvature being less. To figure the size and shape of the outer side plate it is necessary to know the slope of the outer edge of the chute, the outer radius as seen in plan, and the portion of a circle or number of degrees that the chute is to cover as seen in plan.

Suppose that for the 45-deg. chute mentioned, it is to turn one quarter of a circle when viewed from above. Then we find the true slope length along the top or bottom edge of the outer side plate as follows. The horizontal dimension is one-fourth of a circumference whose radius is 60 in., and since the slope is 45 deg., the vertical and horizontal dimensions are the same, and the slope length is equal to the square root of the sum of the squares of the other two sides.

Horizontal dimension

$$= \frac{3.1416 \times 2 \times 60}{4} = 94.248 \text{ in.}$$

True length on the outer slope

$$= \sqrt{94.248^2 + 94.248^2}$$
$$= \sqrt{17765.3710}$$
$$= 133.29 \text{ in.}$$

The slope of the inner side plate would have the same vertical dimension but the horizontal would be based on a 50-in. radius and is equal to

$$\frac{3.1416 \times 2 \times 50}{4} = 78.54 \text{ in.}$$

and the true length on the inner slope is equal to

$$\sqrt{94.248^2 + 78.54^2} = 122.68 \text{ in.}$$

These side plates should then be rolled to the proper radius for each.

In all cases I would suggest that spiral chutes be built with the ends stopping in a vertical plane. If the ends are desired to be in a plane perpendicular to the line of flow, I would suggest the ends be made first with a vertical plane and then cut back to the necessary angle, as this is more practical than trying to figure out the exact shapes required. Fig. 1 indicates how to design the side plates. Fig. 2 shows the side plate dimensions for certain chutes.

For the man who only rarely has to build a spiral chute I would suggest the following method as being a simple one that is sure to get the desired results. If the spiral chute is to be fabricated in the shop, first make the flanged ends or connection pieces, or if such end pieces are not required, make up templates or dummies of the two end connections either of wood or metal and fasten them in their correct positions relative to each other. Next make the inner and outer side plates and fasten them in position by tack

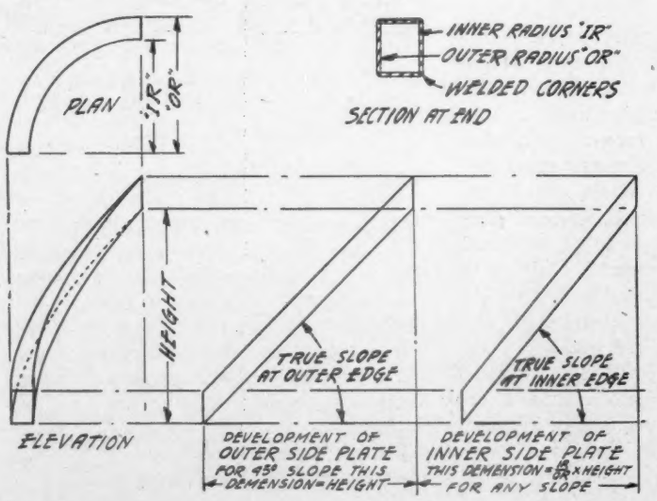
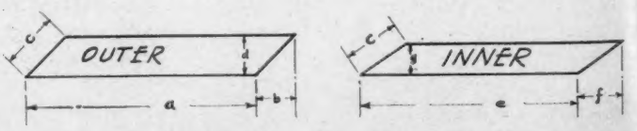


Fig. 1—How to design side-plates

Fig. 2—(Below) Side-plate dimensions for chutes



welds, bolts or clamps. Each side plate before being rolled to the proper curve will have its two edges parallel, while the ends will be shaped to suit the end connections. After fastening the sides in position they should be held there rigidly so that during the fabrication of the top and bottom pieces the sides will not be disturbed.

Next take a piece of plate a little wider than enough to make a short section of top or bottom, let us say with the outer edge about equal in length to the width of chute. After heating in a forge or furnace, if necessary, form this piece of plate so that its edges fit the two side plates. Then trim this to the proper width. This formed piece can now be used as a gage for making additional segments, and your experience in making it will indicate how much larger it is practical to make other segments. It is wise to assemble the top and bottom segments in a stagger system by attaching a bottom segment at the lower end then jump to the bottom segment at the upper end, then next to the lower end and continue in this manner. At the same time watch for any distortion of the side plates or end connections and correct this at once.

The outer edge of the chute should have a slope sufficient to give the desired velocity to the flow of material through the chute. While the inner edge of the chute will have a steeper slope than the outer edge, centrifugal force produced by the material as it swings around the spiral will be just about neutralized by the steeper inner slope and there will be no appreciable side motion of the flowing material.

SIDE PLATES FOR SPIRAL CHUTES
(See Fig. 2)

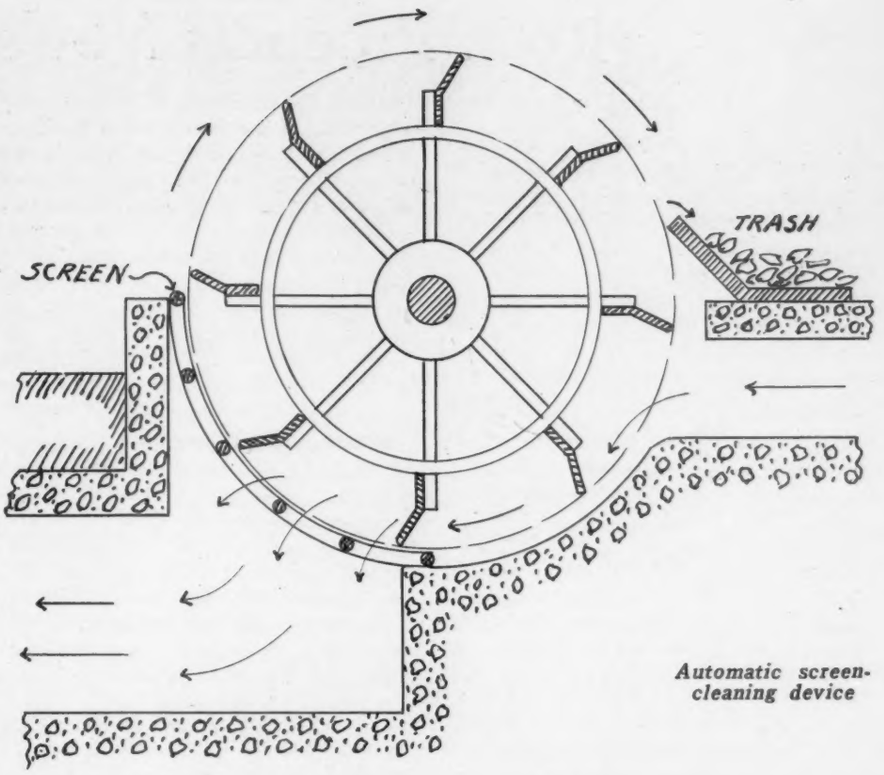
Dimensions for 45 deg. slope at outer edge and one-fourth turn, as seen in plan.

Sq. chute diameter	Outer radius	Height	A	B	C	D	E	F	G
	in.	in.	in.	in.	in.	in.	in.	in.	in.
6 in.	12	18.85	26 66	6	8.48	6	21.07	7.93	3.00
	24	37.70	53.31				34.96	7.19	4.50
	36	56.55	79.97				71.63	6.85	5.00
	48	75.40	106.63				100.19	6.66	5.25
	60	94.25	133.29				126.80	6.54	5.40
	72	113.10	159.85				153.42	6.45	5.50
8 in.	24	37.70	53.31	8	11.31	8	45.30	9.97	5.33
	36	56.55	79.97				71.69	9.72	5.78
	48	75.40	106.63				98.14	9.13	6.67
	60	94.25	133.29				124.72	8.93	6.93
	72	113.10	159.85				151.32	8.79	7.11
10 in.	24	37.70	53.31	10	14.14	10	43.64	12.88	5.83
	36	56.22	79.97				69.76	12.16	7.22
	48	75.40	106.63				96.17	11.72	7.91
	60	94.25	133.29				122.68	11.42	8.33
	72	113.10	159.85				149.18	11.21	8.61
12 in.	24	37.70	53.31	12	16.97	12	42.15	15.87	6.00
	36	56.55	79.97				67.95	14.96	8.00
	48	75.40	106.63				94.25	14.38	9.00
	60	94.25	133.29				120.69	13.98	9.60
	72	113.10	159.85				147.22	13.71	10.00

Self-Cleaning Screen

WHERE the water for a plant is taken from a running stream it is necessary to pass the current through a screen to remove leaves and floating trash. At times such a screen requires considerable attention, especially in the fall of the year, when it may be necessary to employ an extra man for this work.

The device shown will keep the screen free from leaves and trash and requires no attention except to remove the accumulated material. It is in reality an undershot waterwheel. The paddles are set so that they will almost touch the surface of the screen which is made of bars curved to the radius of the outside of the wheel. The paddles go all the way across the wheel and they are bent slightly to serve as buckets in picking up the leaves and trash. This is thrown out after the paddles pass the center and are on the down side. The wheel need not run very fast, and to prevent its running too fast it may be necessary to put on some sort of brake.



Automatic screen-cleaning device

Wheel cleaner

Handy Mounting for Welder

THE CONTINUED GAIN in the use of welding outfits in and about quarry operations is noteworthy for most of the worthwhile operators realize their value. There is also a marked tendency to take the repair outfit to the object to be welded rather than to take the object to the shop. To do this conveniently calls for a certain degree of portability in the welding outfit.

Most of the manufacturers of welding equipment realize this point and hence provide the outfit with some sort of trucks. In most cases these trucks are simply low-bodied trucks with steel wheels. Such a truck works well enough on a concrete floor but on a rough quarry floor the moving of such a truck by hand is not so easy. Hence this progressive western quarry operator (Graham Bros., Inc., Catalina Island, Calif.) mounted the G.-E. electric welding outfit on the chassis of an old model "T" Ford as shown in the illustration. With the outfit the welder and his helper can move the entire unit to practically any place on the quarry floor. This is one of the handiest methods of mounting an electric welding outfit to date.

Portable welding apparatus

Rock Products News Briefs

Cement

Calaveras Portland Cement Co., San Francisco, Calif., reports widespread application of its white portland cement recently introduced for special architectural uses and for certain highway work. It is promoted with the recommendation that colored aggregate and colored pigment be employed to obtain decorative treatment in a wide range of color combinations. For highway work the white cement is being specified for permanent markers, traffic lines and curbings.

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Eleven cement companies are said to have bid identical prices on 1,600,000 bbl. of cement called for by the Illinois State Department of Public Works and Buildings. Further possible use of cement price as a political football was indicated the second week in February when state officials declared that action on the bids had been postponed until Governor Horner's return from a vacation. Bids this year are said to be approximately 25c a barrel higher than the $1.62 price thrice rejected by Governor Horner last year before purchase under special terms was made by the state for 2,000,000 bbl. at $1.44. The price bid on a limited quantity of high-early-strength cement this year is said to be $2.49 a barrel. In December, 1933, when Illinois sought to purchase cement in anticipation of 1934 projects, all but one cement company refused to compete in the bidding on the ground that their code forbade them to do so. The Marquette Cement Manufacturing Co., in a special proposal, submitted a price but stated that NRA officials must approve the action before the bid would be considered in force. Subsequently, General Hugh S. Johnson, in a special order placed states and other political units on a par with the Federal Government which already had received a special dispensation allowing it to negotiate advance purchases of cement for any project regardless of whether a contract had been awarded.

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A capacity of 100 metric tons of cement a day is credited to the first cement plant to be opened in Persia. Recently erected at a cost of $900,000 the plant represented a major advance in the country's industrialization program. According to the U. S. Department of Commerce, product of the new plant is of medium quality.

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Pennsylvania cement producers, according to Philip H. Dewey, Secretary of Internal Affairs for the State, have evidenced great preliminary interest in the long talked of 700-page report on lime deposits and related resources recently completed by Professor B. L. Miller of Lehigh University. An impetus to the Pennsylvania cement industry will follow publication of this report, according to state officials, who expect action as a result of the facts released to be reflected in increased employment, equipment orders, supplies from steel mills and other industries throughout the state. A score of geologists, it is said, cooperated in the five-year survey to give the most complete information to date on depth, extent and quality of limestone deposits in Pennsylvania. In addition, data covered will include an indication of proximity of coal and other fuels to the best of the limestone deposits named.

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Allentown Portland Cement Co. property, including 58 acres of land, 22 dwellings and a small power plant, is involved in condemnation proceedings threatened by the city council of Reading, Penn. Negotiations by the council in regard to the use of the company's property for waterworks development at Ontelaunee Lake have been underway for some time. The property has a value estimated up to $142,000. Arrangements to prevent seepage of lake water into the cement company's quarry have been a factor in the negotiations.

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Alpha Portland Cement Co., Cementon, N. Y., where plant improvement has been underway involving a reported expenditure of approximately $500,000, recently was inspected by visiting officials of the company. Much of the old equipment has been, or is being, scrapped. Over 300 men, including 76 carpenters, now are said to be employed. A substantial enlargement of capacity is planned. Nearby, the **North American Cement Corp.,** Catskill, N. Y., has been employing 147 men, with three kilns in operation.

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Western Portland Cement Co. plant, Baker, Utah (ten miles northwest of Brigham City) recently purchased by Ashby Snow, president and general manager of the Portland Cement Company of Utah, will not be dismantled and its potential capacity of 1,200 bbl. a day will be utilized as soon as business conditions warrant. This was the assurance given recently by Mr. Snow to Brigham City representatives. He disclosed the "real purchasers" as Erastus P. and Herbert A. Snow. The representatives were told that the property, as a result of the sale, is in no way connected with the Portland Cement Company of Utah.

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Following up his threat voiced to the general public as he read into the microphone his recent address before the Associated General Contractors of America, PWA Administrator and Secretary of the Interior Harold L. Ickes suggested on February 6 that he believed the government might well establish an experimental cement manufacturing plant, somewhere in the Tennessee Valley, "Think how far public works monies would go if the government manufactured its own cement," he declared. Answering implications of the proposal, a Chicago cement company official said: "This latest declaration is out of step with the administration and the NRA. Wages have been raised under the code and are now back to the 1929 level. Prices we receive for our product, however, are considerably under five years ago. If the government could operate a plant at 100 per cent capacity and did not consider interest charges, depreciation and taxes, it could probably make cement at lower prices than those now in effect. However, the cement would have to be used close to the place it was made for it is unprofitable to ship this material more than 200 or 250 miles." A subsistence homestead project, suggested Mr. Ickes, would be a good place to start such a plant. He pointed out that the Tennessee Valley has all the necessary materials for cement production. He failed to say anything about existing capacity, generally held to be adequate, in the territory embraced by the Tennessee Valley Authority.

Bernard Kilgore, writing in the *Wall Street Journal*, commented on the latest proposal of the PWA administrator as follows: "The experience that Harold L. Ickes had in May and June last year with cement producers seeking to supply Boulder Dam requirements, probably had something to do with the statements regarding advantages that might be gained by Government-owned cement plants in the Tennessee Valley." Reviewing the development of the basing point plan for cement prices, Mr. Kilgore cited the Federal Trade Commission opinion that the multiple basing point system of prices " 'has lessened competition, retarded adjustment in accordance with the rules of supply and demand and has, therefore, encouraged too much money to go into the cement business.' . . . A reply to Mr. Ickes' suggestion, therefore, cannot be simply that we have too many cement plants and that the industry as a whole is losing money. That won't convince him nor any of those who hold similar views but there certainly should be a way to solve the problem without putting Uncle Sam in another business. The over-capacity problem is not as simple as it may appear. In connection with the Tennessee Valley project, it is noteworthy that between 1920 and 1928 the southeastern group of states was the only one which consumed substantially more portland cement than it produced."

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Alpha Portland Cement Co. storage tanks recently were featured in a full first page illustration in the rotogravure section of the *Birmingham News*. The brief text accompanying the picture mentions the 158,000 bbl. capacity of the tank as enough "to pave about 50 miles of Alabama highway or the equivalent of 800 railroad cars loaded to capacity."

Editorial Comments

The Government As a Chiseler

On March 5 and thereafter presumably the best brains and leadership in American industry will be mobilized by NRA for the ostensible purpose of helping to settle the major difficulties besetting industrial recovery. On that day some 7,000 members of code authorities, and code authorities-to-be, will assemble as a congress or conference in Washington. It is said this will be the first of many such assemblages, and that little is expected of the first one but the opportunity for the President, the National Recovery Administrator, and his cohorts to explain or announce *their* problems, which include the problem of dealing with uniform cost accounting, the degree of price fixing to be allowed in codes, revision of wages and hour levels (upward, and downward, respectively, it is presumed), methods of aiding small business, general plans for broadening credit, strengthening code authorities, and curbing of alleged monopolistic practices.

It would seem that all these problems are quite familiar to all business men, and that the time, even of this first conference, could be better utilized by the President and his National Recovery Administrator in getting the true consensus of opinion of American business on how it would solve them. Spokesmen for each group could obtain such a consensus from their groups in advance, and could present these in such a way as to be helpful to NRA directly, and very much so indirectly by aiding to form favorable public opinion. At present public opinion is very much prejudiced against all attempts of business to help itself, largely by the one-sided and misleading statements issued from time to time by Government officials and spread all over the pages of our daily newspapers.

We have in mind, as probably does the reader, such statements as those recently made by Secretary of the Interior Ickes, that the "high prices" asked for cement should be answered by the Government building its own cement plant. We have the greatest regard for Secretary Ickes' high purpose and unquestioned integrity, his enthusiasm for the public welfare, amounting almost to fanaticism, and all that. But Mr. Ickes is not promoting the true public welfare by such statements, however sincere his motives. He is shaking the confidence of *all* business men in the future of business and industry; he is contributing to the "clogged capital market" which is giving so much concern to his fellow New Dealers; in short he is seriously hindering recovery progress, which we all know he really does not want to do. Apparently, he is misguided and misinformed.

For example, he said, "if we did not have to pay *more* than cement is worth, think how much further our PWA money would go, how many more projects we could have." We don't know how he determines that PWA is paying more for cement than it is worth. He probably means more than it cost. However, granting that it is sold for a profit, what becomes of this profit? We think we know more about the cement industry than Mr. Ickes. We know that if the cement industry makes a profit this year and next it will not go into dividends to plutocrats, which is evidently what he fears. It will go to make up deficits the cement companies have acquired the last three or four years as a result of selling cement for *less* than it was worth. It will go to make good very much depleted depreciation and obsolescence accounts.

More than all these, though they are all necessary to business recovery, most of the profits of the cement industry for some time to come will go into rehabilitation of plants, into new and better machinery and equipment; in fact into those very same capital goods industries which are giving the New Dealers such a headache, because nothing done yet has helped at all to revive them. The profits of the cement industry, and of all the rock products industries for that matter, will go very largely into the payrolls of machinery manufacturers, steel producers, and equipment and material makers of hundreds of kinds. The only chance for profits these industries have this year, or any year so far as one can see now, must come out of the PWA funds that Mr. Ickes spends.

Let's carry the specific case farther, because Rock Products as well as its readers is vitally interested in having Mr. Ickes and the other New Dealers see, if possible, that fair profits, far from preventing more projects, will greatly increase the number of projects and "make his money go further" although it won't be for PWA projects. The projects that profits will increase will be private industry projects, or spending, which (if Mr. Ickes and the other New Dealers are to be believed) are the very kind of projects they are trying to promote. Now, some small part of the money machinery manufacturers receive out of the profits of the rock products industry they will most certainly spend for advertising space in Rock Products and other publications. Rock Products' small part of Mr. Ickes' PWA money, when and if it reaches us, will certainly not go to promote plutocracy. It will go to increase our payroll, to buy more paper, more engravings, more printing, etc.; to promote more business all along the line.

Thus we might take any minute fraction of the profit from PWA work, which Mr. Ickes is so anxious to avoid, and show how it goes from one industry to another, increasing purchasing power, promoting business, expanding credit, bringing back prosperity all the way down the line. On the other hand, if PWA must buy all materials at cost, the only good accomplished is the furnishing of the wherewith-all for the payrolls of those immediately engaged in the work itself. It will all be spent for the bare necessities of life, in the consumer goods industries, which are and have been operating on a nearly normal basis. Only by continuing such public works indefinitely is there any prospect of keeping the population alive, and there will be no possibility of reviving the capital goods industries through such spending.

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividend
Allentown P. C., com.[47]	2-20-34	5	6	
Allentown P. C., pfd.[47]	2-20-34	6	8	
Alpha P. C., com	2-24-34	16	17	
Alpha P. C., pfd.	1- 2-34	75	....	1.75 qu. Mar. 1, '34
Amalgamated Phos. 6's, '36[47]	2-20-34	95	98	
American Aggregates, com.[47]	2-20-34	1	2	
American Aggregates, pfd.[47]	2-20-34	6	9	
American Aggregates 6's, w.w[47]	2-20-34	30	35	
American Aggregates 6's, ex. w.[47]	2-20-34	30	35	
American L. and S., 1st 7's[47]	2-20-34	71	75	
Arundel Corp., com.[47]	2-20-34	22	25	25c qu. Jan. 2, '34
Bessemer L. and C., Class A[47]	2-20-34	3	5	
Bessemer L. and C., 1st 6½s[47]	2-20-34	17	20	
Bessemer L. and C., cert. of dep.[47]	2-20-34	17	20	
Bloomington Limestone 6's[47]	2-20-34	8	10	
Boston S. and G., new com.[37]	12-11-33	1	3	
Boston S. and G., new 7% pfd.[37]	12-11-33	5	10	
Boston S. and G., 7's, 1934[37]	12-11-33	40	60	
California Art Tile, A	2-15-34	1	2	
California Art Tile, B[9]	12-11-33	....	1	
Calaveras Cement, com	2-20-34	½	2	
Calaveras Cement, 7% pfd.	2-20-34	47½	75	1.75 qu. Jan. 15,'34
Canada Cement, com	2-23-34	11⅜	11¼	
Canada Cement, pfd.	2-23-34	48	50	
Canada Cement, 5½s, 1947	2-20-34	88	92	
Canada Crushed Stone bonds[42]	12-11-33	63	67	
Canada Crushed Stone, com.[42]	12-11-33	5 (nominal)		
Certainteed Products, com.	2-24-34	5⅞	6⅛	
Certainteed Products, pfd.	2-24-34	26	29⅛	
Certainteed Products, 5½s, '48	2-24-34	65¼	....	
Cleveland Quarries	1-30-34	....	25	
Consol. Cement, 1st 6½s A[47]	2-20-34	20	22	
Consolidated Cement, pfd.[47]	2-20-34	1	2	
Consolidated Oka S. and G. (Canada) 6½s[12]	10-13-33	....	20	
Consolidated Oka S. and G. (Canada), pfd.[42]	10-13-33	No market		
Consol. Rock Prod., com[47]	2-20-34	½	1	
Consol. Rock Prod., pfd.[47]	2-20-34	1	2	
Consol Rock Prod., units[47]	2-20-34	2	3	
Consol. S. and G., pfd. (Can.)[12]	10-13-33	No market		
Construction Mat., com.[47]	2-20-34	1	2	
Construction Mat., pfd.[47]	2-20-34	2	4	
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[16]	2-27-34	24	....	
Coosa P. C., 1st 6's[47]	2-20-34	10	15	
Coplay Cement Mfg., pfd.[47]	2-20-34	5	7	
Coplay Cement Mfg., 6's, '41[47]	2-20-34	40	45	
Dewey P. C., com.[47]	2-20-34	50	75	
Dolese and Shepard	2-23-34	11½	13½	
Dufferin Pav. & Cr. Stone, com.	2-20-34	4	....	
Dufferin Pav. & Cr. Stone, pfd.	2-20-34	24	....	
Edison P. C., com.[47]	2-20-34	1	3	
Edison P. C., pfd.[47]	2-20-34	4	6	
Federal P. C. 6½'s, 1941[47]	2-20-34	30	33	
Florida Port. Cement 6½'s, '37	2-23-34	56	....	
Giant P. C., com.[47]	2-20-34	1½	3	
Giant P. C., pfd.[47]	2-20-34	6	10	
Gyp. Lime & Alabastine, Ltd.	2-20-34	8⅝	....	
Gyp. Lime & Alabastine 5½'s, 1948	2-20-34	71½	73½	
Hermitage Cement, com.[47]	2-20-34	10	15	
Hermitage Cement, pfd.[47]	2-20-34	35	40	
Ideal Cement 5's, 1943[47]	2-20-34	99	101	
Ideal Cement, com	2-22-34	27	30	25c qu. Jan. 6, '34
Indiana Limestone 6's[47]	2-20-34	12	15	
International Cement bonds, 5's	2-24-34	89½	....	Semi-annual int.
International Cement, com.	2-24-34	31	31½	
Kelley Island L. and T.	2-23-34	10	11	
Ky. Cons. Stone, 6½'s, 1933	2-24-34	5	6	
Ky. Cons. Stone, com.[47]	2-20-34	1	2	
Ky. Cons. Stone, pfd.[47]	2-20-34	....	5	
Ky. Cons. Stone, 7% pfd.[47]	2-20-34	....	5	
Ky. Cons. Stone, 1st Mtg.,6½'s[46]	2-27-34	7	....	
Ky. Cons. St. Y. T. C.[47]	2-20-34	....	2	
Ky. Rock Asphalt, com.	2-24-34	⅜	¾	
Ky. Rock Asphalt, pfd.	2-24-34	6	8	
Ky. Rock Asphalt 6½'s, 1935	2-24-34	58	....	
Kentucky Stone, com.	8-19-33	....	¼	
Kentucky Stone, pfd.	8-19-33	....	10	
Lawrence P. C.	2-21-34	14½	17½	
Lawrence P. C., 5½'s, 1942[47]	2-20-34	65	70	
Lehigh P. C., com.	2-23-34	18½	19¼	
Lehigh P. C., pfd.	2-23-34	73¾	75	87½c qu. Apr. 2, '34
Louisville Cement[47]	2-20-34	65	75	
Lyman-Richey 1st 6's, 1935[47]	2-20-34	85	90	
Marbelite Corp., com. (cement products)[47]	2-20-34	25c	40c	
Marbelite Corp., pfd.[47]	2-20-34	50c	....	
Marquette Cement, com.[47]	2-20-34	14	16	
Marquette Cement, pfd.[47]	2-20-34	46	50	
Marquette Cem. Mfg. 1st 5's, 1936[47]	2-20-34	70	75	
Marquette Cem. Mfg. 1st 6's, 1935[46]	2-27-34	90	....	
Material Service Corp.[47]	2-20-34	4	6	
McCrady-Rodgers, com.[47]	2-20-34	7	9	
McCrady-Rodgers, 7% pfd.[47]	2-20-34	35	40	
Medusa P. C., com.[47]	2-20-34	8	10	
Medusa P. C., pfd.[47]	2-20-34	35	40	
Michigan L. and C., com.[47]	2-20-34	60	65	
Missouri P. C.[47]	2-20-34	8	9	
Monarch Cement, com[47]	2-20-34	50	60	
Monolith P. C., com.[47]	2-20-34	2	....	
Monolith P. C., pfd.[47]	2-20-34	5	6	
Monolith P. C. units[47]	2-20-34	7	10	
Monolith P. C. 1st Mtg. 6's[47]	2-20-34	80	85	
Monolith Portland, Midwest[47]	12-15-33	50c	75c	
National Cem. (Can.), 1st 7's	10-13-33	No market		
National Gypsum A, com.	2-23-34	7	7¼	
National Gypsum, pfd.	2-23-34	74½	76½	
National Gypsum 6's[47]	2-20-34	82	85	
National L. & S., 6½'s, 1941[47]	2-20-34	65	70	
Nazareth Cement, com.[47]	2-20-34	2	4	
Nazareth Cement, pfd.[47]	2-20-34	30	35	
Newaygo P. C. 1st 6½'s[47]	2-20-34	40	43	
New England Lime 6's, 1935[14]	12-11-33	8	10	
N. Y. Trap Rock 1st 6's, 1946	2-24-34	63	....	
N. Y. Trap Rock, 7% pfd.[47]	2-20-34	65	70	
North Amer. Cement 1st 6½'s[47]	2-20-34	25	30	
North Amer. Cement, com.[47]	2-20-34	1	2	
North Amer. Cement, 7% pfd.[47]	2-20-34	3	5	
North Shore Mat. 1st 6's[47]	2-20-34	40	45	
Northwestern States P. C.[47]	2-20-34	40	45	1.50 Jan. 2, '34
Northwestern Port. Cem. units	12-19-33	28	32	
Ohio River S. and G., com.	2-24-34	....	5	
Ohio River S. and G., 1st pfd.	2-24-34	....	50	
Ohio River S. and G., 2d pfd.	2-24-34	20	....	
Ohio River S. and G., 6's[47]	2-20-34	10	12	
Oregon P. C., com.[47]	2-20-34	12	15	
Oregon P. C., pfd.[47]	2-20-34	65	70	
Pacific Coast Aggr., com.[40]	12-11-33	....	10c	
Pacific Coast Aggr., pfd.[40]	12-11-33	15c	30c	
Pacific Coast Aggr., 6½'s, '44	10-13-33	15	17	
Pacific Coast Aggregates, 7's[47]	2-20-34	5	10	
Pacific Coast Cement 6's, 1937[47]	2-20-34	45	50	
Pacific P. C., com.[47]	2-20-34	6	8	
Pacific P. C., pfd.[46]	2-27-34	29	....	
Pacific P. C. 6's, 1935[47]	2-20-34	95	98	
Pacific P. C., 6½'s, pfd.[47]	2-20-34	30	35	
Peerless Cement, com.[47]	2-20-34	¼	¾	
Peerless Cement, pfd.[47]	2-20-34	1	2	
Penn.-Dixie Cement, com.	2-24-34	6½	6¾	
Penn.-Dixie Cement, pfd.	2-24-34	25	29	
Penn.-Dixie Cement 6's A	2-24-34	74⅛	....	
Penn. Glass Sand Corp., pfd.[47]	2-20-34	70	75	1.75 Jan. 2, '34
Penn. Glass Sand Corp., 6's[47]	2-20-34	95	98	
Petoskey P. C., com.[47]	2-20-34	2	3	
Petoskey P. C., 6's, 1941[47]	2-20-34	42	45	
Petoskey P. C. 6's, 1935	12-19-33	39	43	
Phosphate Mining Co. (N. Y.), com.	12-19-33	No market		
Port Stockton Cem., com.[9]	12-11-33	No market		
Republic P. C., 6's, 1943[47]	2-20-34	66	70	
Riverside Cement, A[47]	2-20-34	10	13	47½c Feb. 1, '34
Riverside Cement, B[47]	2-20-34	2	3	
Riverside Cement, pfd.[47]	2-20-34	75	80	1.50 qu. Feb. 1, '34
Rockland and Rockport Lime, 1st pfd.[47]	2-20-34	2	3	
Sandusky Cement 6's[47]	2-20-34	35	40	
Sandusky Cement 6½'s, 1932-1937[47]	2-20-34	40	45	
Santa Cruz P. C., com.[47]	2-20-34	60	65	1.00 qu. Jan. 2, '34
Schumacher Wallboard, com.[47]	2-20-34	1	3	
Schumacher Wallboard, pfd.[47]	2-20-34	12	15	
Signal Mt. P. C., pfd.[47]	2-20-34	12	16	
Signal Mt. P. C. 6's, '36	2-23-34	82	....	
Southwestern P. C., units[47]	2-20-34	175	200	
Southwestern P. C., com.[47]	2-20-34	30	35	
Southwestern P. C., pfd.[47]	2-20-34	80	90	
Standard Paving & Mat. (Canada), com.[47]	2-20-34	4	5	
Standard Paving & Mat., pfd.[47]	2-20-34	25	....	
Superior P. C., A[47]	2-20-34	20	22	
Superior P. C., B[47]	2-20-34	7	9	
Trinity P. C., units[47]	2-20-34	30	35	
Trinity P. C., com.[47]	2-20-34	5	10	
Trinity P. C., pfd.[47]	2-20-34	25	30	
U. S. Gypsum, com.	2-23-34	44	44½	25c qu. Jan. 2, '34
U. S. Gypsum, pfd.	2-23-34	118⅝	125	1.75 qu. Jan. 2, '34
Wabash P. C.[47]	2-20-34	5	6	
Warner Co., com[47]	2-20-34	3	5	
Warner Co., 1st 7% pfd.[47]	2-20-34	20	25	
Warner Co., 6's, 1944, w.w.[47]	2-20-34	15	20	
Warner Co., 6's, 1944, ex.w.[47]	2-20-34	15	20	
Whitehall Cem. Mfg., com.[47]	2-20-34	20	25	
Whitehall Cem. Mfg., pfd.[47]	2-20-34	35	40	
Wisconsin L. & C., 1st 6's, '33[47]	2-20-34	85	90	
Wisconsin L. & C. 6½'s[47]	2-20-34	85	90	
Wolverine P. C., com.[47]	2-20-34	2	3	
Yosemite P. C., A com.[47]	2-20-34	2	3	

Quotations by: [9]A. E. White Co., San Francisco, Calif. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [14]First Wisconsin Co., Milwaukee, Wis. [37]Wise, Hobbs & Arnold, Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thompson & Co., Toronto. [46]First Union Trust & Savings Bank, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill.

Wolverine Portland Cement Co., Coldwater, Mich., reports for the calendar years ended December 31, a condensed operating statement as follows:

	1933	1932
Net sales	$240,855	$212,956
Cost of sales	164,708	214,943
Depreciation and depletion	31,430	60,428
Selling, general, and administration expense	36,179	37,898
Operating profit	8,538	(d)100,314
Other income	3,533	3,761
Total income	12,071	(d)96,553
Taxes, etc.	3,838	4,477
Net profit	8,234	(d)101,030
Surplus, January 1	(d)73,803	32,585
Investment reserve	1,150	5,359
Depreciation on idle plant	24,928	.....
Taxes on idle plant	4,781	.....
Deficit, December 31	96,429	73,803

BALANCE SHEET OF WOLVERINE PORTLAND CEMENT CO.
(As of December 31)

Assets:	1933	1932
*Land, clay and marble deposits	$ 42,823	$ 52,913
†Plant and equipment	511,466	556,406
Current Assets:		
Inventories	207,840	180,599
‡Market securities	13,926	15,185
Cash	79,514	91,417
Notes and accounts receivable, net	15,841	30,269
Restricted cash	12,425	634
Deferred charges, etc.	29,415	17,603
Total	$913,249	$945,027
Liabilities:		
Common stock (par $10)	$1,000,000	$1,000,000
Current Liabilities:		
Accounts payable	8,841	7,001
Accruals	837	11,829
Deficit	96,429	73,803
Total	$913,249	$945,027
Current assets	$317,121	$317,470
Current liabilities	9,678	18,830
Working capital	307,443	298,640

*Less depletion: 1933, $94,210; 1932, $91,220. †Less depreciation: 1933, $960,226; 1932, $906,858. ‡Cost $37,788; at quoted market value in 1933 and at approximate market value in 1932.

The last dividend paid was in 1930.

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Consumers Rock and Gravel Co., Los Angeles, Calif., which was absorbed by the Consolidated Rock Products Co., according to press reports, has notified holders of its first mortgage 6% bonds, due 1948, that cash and bonds have been deposited with the trustee to cover interest and sinking fund payments due January 2, 1934, but not paid at that time.

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Gypsum, Lime and Alabastine, Canada, Ltd., Montreal, Que., reports net loss for 11 months ended November 30, 1933, of $111,319 after interest, depreciation, depletion, taxes, losses of subsidiaries and after $6,757 inventory write-down. For year ended December 31, 1932, company reported net loss of $295,570. Fiscal year has been changed to end November 30, instead of December 31. Current assets as of November 30, 1933, amounted to $873,525 and current liabilities were $330,230 compared with $1,023,484 and $346,213, respectively, on December 31, 1932.

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Pennsylvania-Dixie Cement Corp., New York City, Blaine S. Smith, president, reports that during the year 1933 the aerial tramway to Plant No. 6, Bath, Penn., was extended, thus concentrating all quarrying operations for the three Lehigh Valley plants in one location. A power transmission line was constructed between these three plants to permit interchange of power. All told, these improvements called for capital expenditure of $205,250, with satisfactory saving in operating costs.

The following paragraphs are quoted from the report:

Notwithstanding the duty of 23c per bbl., foreign cement continues to enter the country and is being sold in New York and Boston for less than our price.

Highway funds consisting of gasoline taxes and license fees continue in a number of States to be diverted in large amounts from highway construction and maintenance to unemployment relief and general purposes of government. This, of course, adversely affects our business as every million dollars diverted costs the cement industry a market for 100,000 bbl. of cement. On every opportunity public officials should be reminded that the concrete highway is in effect a self-liquidating project, and that about 90c of every dollar spent for a concrete road is paid out in wages and salaries.

Our industry began the preparation of its Code of Fair Competition immediately upon the enactment by Congress in June of the National Industrial Recovery Act. Approval by the President was obtained November 27, and the code became effective December 7, 1933. On July 13, 1933, the industry advised President Roosevelt that it would, on or before August 1, advance wages and shorten hours to the basis to be proposed in its code, without awaiting approval of it, and our company fulfilled this promise. Notwithstanding the resulting increase in operating expenses and higher costs of coal and other supplies, our average bin cost of sales was very satisfactory due to further increases in operating efficiency.

Certain phases of the President's Recovery Program have undoubtedly benefited our industry in arresting the decline in cement consumption, and continued benefits can be expected. Of the total appropriation in the NIRA, amounting to $3,300,000,000, generally supposed to be for public works, less than half can be used for construction work involving cement, the remainder having been appropriated for various enterprises, such as farm credit (AAA), naval vessels, civilian conservation camps, etc. Of the amount available for construction work involving cement, comparatively few projects have yet reached a cement using stage, aside from the $400,000,000 specifically appropriated for highways. This work, however, will require substantial amounts of cement in 1934, and some will doubtless be carried over beyond the current year. Of the $400,000,000 appropriated for highways, about two-thirds has been advertised for contract, and something less than one-half is under construction or completed. While these federal appropriations for construction may seem large, they are in reality small when compared to the average annual construction programs of over $6,000,000,000 during the eight-year period preceding 1931, according to estimates supplied by F. W. Dodge Corp.

The value of construction contracts awarded in 1933, including federal works, was 6.5% less than the year before.

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Recent Dividends Announced

Alpha Portland Cement		
7% pfd. (qu.)	$1.75	March 1, 1934
Lehigh Portland Cement		
pfd. (qu.)	.87½	Apr. 2, 1934

CONSOLIDATED INCOME SHEET OF PENNSYLVANIA-DIXIE CEMENT CORP.
(As of December 31)

	1933	1932
Net sales	$2,736,133	$3,476,723
Expenses (less other income)	2,456,910	3,370,547
Balance	$ 279,223	$ 106,176
Depreciation and depletion	1,376,879	1,382,402
Interest	577,083	590,005
Federal taxes	.....	.....
Net loss	$1,674,739	$1,866,231
Profit and loss surplus	‡2,838,890	515,846

‡After crediting account with $36,651 profit on purchase of bonds of corporation under par, $361,132 excess of par value over cost of preferred stock retired, and $3,600,000 reduction in stated value of common stock as approved by stockholders on May 2, 1933.

CONSOLIDATED BALANCE SHEET OF PENNSYLVANIA-DIXIE CEMENT CORP.
(As of December 31)

Assets:	1933	1932
*Land, buildings, machinery and equipment	$20,789,169	$21,958,113
Cash	2,357,834	2,910,286
Short term securities	.....	.....
Notes and accounts receivable	265,118	341,827
Inventories	1,893,858	1,772,847
Investment, etc.	100,793	93,639
Deferred charges	18,883	22,129
Total	$25,425,655	$27,098,841
Liabilities:		
Preferred stock	$12,120,000	$12,500,000
†Common stock	400,000	4,000,000
Gold bonds	9,557,000	9,655,000
Accounts payable	143,820	78,962
Accrued taxes, interest, etc.	255,276	241,336
Federal tax reserve	.....	.....
Contingent reserve	35,726	35,726
Other reserves	74,943	71,971
Surplus	2,838,890	515,846
Total	$25,425,655	$27,098,841

*After depreciation and depletion. †Represented by 400,000 no-par shares.

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Boston Sand and Gravel Co., Boston, Mass.: Annual report for the year ending December 1, 1933, states: Due to the work started in New England by the PWA and CWA, the company's business is better than it was a few months ago. It cannot be said definitely that the corner has been turned, but certainly conditions are better, and every one in the industry is looking forward to an improvement in 1934. The accrued and unpaid dividends on preferred stock amount to 7% of par value, which gives the preferred stock holders full and exclusive voting power.

CONSOLIDATED BALANCE SHEET OF BOSTON SAND AND GRAVEL CO.
(As of December 1, 1933)

ASSETS

Current assets:		
Cash	$ 45,950.13	
Readily marketable securities	47,707.58	
Accounts and notes receivable (less reserve, $12,400)	123,332.60	
Securities and investments	59,253.54	
Inventories	9,016.32	$285,260.17
Prepaid assets		6,375.01
Deferred charges		14,764.07
Capital assets:		
Plants and property	$3,085,319.15	
Accrued depreciation	997,755.13	2,087,564.02
		$2,393,963.27

LIABILITIES

Current liabilities:		
Accounts payable		$ 16,456.05
Accrued liabilities		9,586.27
Capital liabilities:		
Purchase money mortgages	$ 60,150.00	
Debenture bonds	398,500.00	
Preferred stock issue (17,534 shares)	876,700.00	
Common stock equity	1,032,570.95	2,367,920.95
		$2,393,963.27

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of February 17:

New England

31403. **Crushed stone** (trap rock), (See Note 3), from Westfield to Baldwinville, Mass. Present—96c N. T. Proposed—80c N. T. (to expire March 31, 1934).

31411. **Crushed stone** (trap rock), (See Note 3), from Westfield to Chester, Mass. Present—60c N. T. Proposed—50c N. T. (to expire March 31, 1934).

Trunk Line

31949. **Sand, blast, core, engine, fire, foundry, glass, loam, moulding or silica,** C. L. (See Note 2), from Dunbar, Pa., to Cheswick, Pa., $1.35, and Burgettstown, Pa., $1.53 per net ton.

31955. **Crushed stone, coated with oil, tar or asphaltum,** C. L. (See Note 2), from Utica, N. Y., to Parksville and Liberty, N. Y., $1.50 per net ton.

31956. **Crushed stone, coated with oil, tar or asphaltum,** C. L. (See Note 2), from Wertz, Pa., to Irwin, Pa., $1.33 per net ton.

31966. **Limestone, ground or pulverized and limestone dust,** C. L., min. wt. 50,000 lb., from Jamesville, N. Y., to stations on the Delaware & Northern R. R., $2.30 per net ton.

31982. **Crushed or ground slate, also slate dust,** C. L., minimum weight 50,000 lb., from Whiteford, Cardiff, Md., Delta and Slate Hill, Pa., to New York, N. Y., and Brooklyn, N. Y., 16½c per 100 lb.

32007. **Stone, natural** (other than bituminous asphalt rock), **crushed, coated with oil, tar or asphaltum,** C. L. (see Note).

Note—The weight of the oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, shipper to so certify on shipping orders and bills of lading.

(See Note 2) from Bedford Hills, N. Y.

To	Proposed rates
Old Chatham, N. Y., to Brainard, N. Y.	$1.55
Adams Crossing, N. Y., to Lebanon Springs, N. Y.	1.60
Stephentown, N. Y., to Cherryplain, N. Y.	1.65
Center Berlin, N. Y., to Petersburg Jct., N. Y.	1.70
Bennington, Vt.	1.75
White Creek, N. Y., to Sunderland, Vt.	1.80
Manchester, Vt., to North Dorset, Vt.	1.85
Danby, Vt., to Clarendon, Vt.	1.90
Rutland, Vt.	1.95

Rates in cents per net ton. Present rates, 6th class.

32019. **Stone, natural** (other than bituminous asphalt rock), **crushed or broken uncoated or coated with oil, tar or asphaltum,** C. L. (See Note.)

Note: The oil tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading.

From Oriskany Falls, N. Y., to Marcellus, N. Y., $1.30 per net ton, on uncoated stone and $1.40 per net ton on coated stone.

Central

38634. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry glass, grinding or polishing, loam, moulding and silica), and **gravel,** C. L., from Columbus, Ind., to Medora, Ind., rate of 80c per N. T. Route—Via P. R. R., Seymour, Ind., B. & O. R. R.

38658. To establish on **stone, crushed,** in bulk and **crushed stone screenings** (in bulk), in open top cars, carload, from Genoa and Martin, O., to Gibsonburg, O., rate of 75c per net ton.

38660. To cancel commodity rates published in B. & L. E. R. R. Tariff I. C. C. No. 976, as follows, permitting classification basis to apply: Commodities—**Stone: Broken, quarry scrap, rip rap, rough, rubble, spawls,** from Greenville, Kremis, Fredonia, Mercer, Hallston, Euclid, East New Castle, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Stone: Crushed, screenings, from Portersville and East New Castle, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Firestone from Mercer and Portersville, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Firestone, rip rap; firestone, spawls, from Mercer, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Limestone, agricultural, from East New Castle, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Limestone, agricultural (not ground or pulverized), from Bradys Bend, Kaylor, Portersville and East New Castle, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Limestone, crude cement; limestone, fluxing, from Portersville, Rose Point and East New Castle, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

Limestone, ground or pulverized, from East New Castle, Pa., to Illinois, Indiana, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia.

38751. To establish on **stone, crushed; stone screenings,** in open top cars, in bulk, C. L., rates in cents per net ton, to apply:

FROM CAREY, O.

To	*Pres., Cents Cwt.	Prop.
Cotton Hill, W. Va.	26	195
Quinnimont, W. Va.	26	205
Hinton, W. Va.	26	215
Ronceverte, W. Va.	29	225
White Sulphur Springs, W. Va.	29	235

FROM MARION, O.

To	*Pres., Cents Cwt.	Prop.
Cotton Hill, W. Va.	23	185
Quinnimont, W. Va.	24	195
Hinton, W. Va.	24	205
Ronceverte, W. Va.	27	215
White Sulphur Springs, W. Va.	27	225

*Sixth class, gross ton same as net.

FROM OWENS, O.

To	*Pres., Cents Cwt.	Prop.
Cotton Hill, W. Va.	23	180
Quinnimont, W. Va.	24	195
Hinton, W. Va.	24	205
Ronceverte, W. Va.	27	215
White Sulphur Springs, W. Va.	27	215

38752. To establish on **core sand,** C. L., from Oak Shade, O., to Detroit, Mich., 100c per net ton.

38661. To cancel commodity rates published in B. & L. E. R. R. Tariff I. C. C. No. 993, as follows, permitting classification basis to apply: Commodities—**Gravel; sand** (other than blast, engine, foundry, glass, moulding or silica), from West Springfield, East New Castle and West Pittsburgh, Pa., to points east of the western termini of Eastern Trunk Lines, also eastern Canada. Also Fredonia and Mercer, Pa., to points in states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont and eastern Canada.

Limestone: Agricultural, dust, ground, pulverized, from East New Castle, Pa., to points east of the western termini of Eastern Trunk Lines; also eastern Canada.

Sand, blast, engine, foundry, glass, moulding or silica, from East New Castle and West Pittsburgh, Pa., to points east of the western termini of Eastern Trunk Line; also eastern Canada.

Stone, broken, in bulk, from Portersville and East New Castle, Pa., to points east of the western termini of Eastern Trunk Lines; also eastern Canada.

Stone, crushed, in bulk; stone, screenings, in bulk, from Portersville and East New Castle, Pa., to points east of the western termini of Eastern Trunk Lines; also eastern Canada.

Stone, fire, from Mercer and Portersville, Pa., to points east of the western termini of Eastern Trunk Lines; also eastern Canada.

Account obsolete.

38662. To cancel rates on **sand, gravel or loam,** from East New Castle, and West Pittsburgh, Pa., to points in C. F. A. territory and Canada, as published in B. & L. E. R. R. Tariff I. C. C. 942.

38713. To establish on **sand and gravel,** C. L., in open top equipment (See Note 3), from Columbus and South Columbus, O., to Logan, O., rate of 80c per net ton.

38714. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, moulding and silica), and gravel, in open top cars, C. L., from Columbus, O., to Waldo, O., rate of 60c per net ton. Route: Via P. R. R. direct.

38678. To establish on **stone, crushed** (in bulk), limestone, agricultural (not ground or pulverized), (in bulk in open top cars) and limestone, unburned, agricultural (in bulk in open top cars), C. L., from Spore, O., rates in cents per net ton except as noted:

To	Prop.	Pres., Cents Cwt.
Cotton Hill, W. Va.	200	26
Quinnemont, W. Va.	210	26
Hinton, W. Va.	220	26
Ronceverte, W. Va.	240	29
White Sulphur Springs, W. Va.	240	29
Hewlet, W. Va.	190	24
Kermit, W. Va.	200	24
Naugatuck, W. Va.	210	24
Matewan, W. Va.	210	27
Panther, W. Va.	220	27
Welch, W. Va.	230	27
Wayne, W. Va.	190	24
Doane, W. Va.	200	24

38679. To establish on **sand,** refuse foundry, C. L., minimum weight 50,000 lb., from Muncie, Ind., to Cincinnati, O., rate of 135c per N. T.

38756. To establish on **sand** (except blast, core, engine, filter, fire or furnace foundry, glass grinding or polishing, loam, moulding or silica), and gravel, C. L., in open top equipment, from Leeland, Ind., to Bremen, Ind., rate of 55c per net ton.

38754. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel, in open top equipment, carload, from Lodi, O., to B. & O. R. R. destinations in Ohio, viz.: Proposed rates to Alexanders, 85; Beach City, 80; Berea, 60; Bowling Green, 105; Brecksville, 85; Butler, 95; Cambridge, 105; Canton, 80; Chardon, 105; Chippewa Lake, 50; Clinton, 50; Cuyahoga Falls, 60; Deshler, 105; Elyria, 60; Flushing, 105; Freeport, 100; Galatea, 100; Greenwich, 60; Kent, 80; Kimball, 80; Leavittsburg, 95; Lowellville, 105; McComb, 105; Mansfield, 85; Medina, 50; Monroeville, 80; Newark, 105; New Philadelphia, 90; Newton Falls, 90; Niles, 95; Painesville, 105; Plymouth, 60; Ravenna, 85; Rittman, 40; Shelby, 60; Strasburg, 85; Strongsville, 60; Tiffin, 90; Toledo, 95; Uhrichsville, 90.

38758. To establish on **crushed stone, agricultural limestone and agricultural limestone screenings,** in open top cars, C. L., from Carey, O., rates in cents per net ton:

Proposed rates to Amsterdam, O., 135; Alliance, O., 125; Loveland, O., 125; Bridgeport, O., 145; Ravenna, O., 115; Jewett, O., 135; Conotton, O., 125; Kensington, O., 135; Stone Creek, O., 125; Freeport, O., 135.

38759. (a) To restrict application of rate of $1.77 per net ton on **sand and gravel,** C. L., from Louisville, Ky., and points taking same rates to Cincinnati, O., and points taking same rates, i.e., Covington and Newport, Ky.; also rate of $1.76 per net ton applicable in the reverse direction, Item 185–A, Sup. 9 to C. F. A. L. Tariff 232–M, and rate of $1.89 per net ton applicable on sand and gravel, carload, as described in Item 190–A, Sup. 9 to C. F. A. L. Tariff No. 232–M, from Cincinnati, O., and points taking same rates, i.e., Covington and Newport, Ky., to Louisville, Ky., and points taking same rates, also rate of $1.77 per net ton applicable in reverse direction by providing for non-application of said rates for account of the L. & N. R. R. (b) To cancel application of rate of $1.10 per net ton for account of the L. & N. R. R. on sand and gravel, carload, as described in Item 203 C. F. A. L. Tariff 232–M.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Notoe 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

between Louisville, Ky., and points taking same rates and Cincinnati, O., and points taking same rates, i.e., Covington and Newport, Ky., C. F. A. L. Tariff 232–M to be amended, provided cross–reference to Agent Speiden's Tariff 388–A, for rate to apply via the L. & N. R. R. (c) To revise restriction now published for account of the L. & N. R. R., in connection with rate of $1.73 per net ton on sand and gravel, carload, as described in Item 200 of C. F. A. L. Tariff 232–M, from Cincinnati, Cleves and Delhi, O., to Louisville, Ky., to read as follows: "Will not apply via the L. & N. R. R. For rate, see Agent Speiden's 388–A, I. C. C. 1635." Present: "Will not apply via the L. & N. R. R. direct. For rate, see Item 203." (d) To restrict application of rate of 70 cents per net ton on sand and gravel, carload, published in Item 5594 of C. F. A. L. Tariff 237–K, description "B," page 104 thereof, between Evansville, Ind., and Henderson, Ky., by providing for the non–application of said rate for account of the L. & N. R. R., rate to apply in lieu thereof being mileage scale rate of 55c per net ton published in Agent Speiden's Tariff 388–A, C. F. A. L. Tariff mentioned above to provide an appropriate cross reference to Agent Speiden's Tariff at the time proposed restriction is published. Route: Via L. & N. R. R. direct.

38771. To establish on **stone, viz.: breakwater, quarry scrap,** C. L., from West Ellwood Jct. and Ellwood City, Pa., to Buffalo, N. Y., rate of 140c per N. T. Routes: Via all available routes.

38789. To restrict application of rates on **crushed stone,** C. L., including broken, chatts, chip, cinders, dirt, ground ganister, crushed granite, ground, macadam, marble chips, rip rap, rubble, crushed (not granulated) slag, screenings, soil, stone dust, strippings, published in agency (see exception) and/or individual lines tariffs from Chicago, Gary, Joliet, Kankakee, Lehigh, McCook and Thornton, Ill., to Ohio River crossings, viz., Brookport, Cairo, Joppa, Metropolis, Jeffersonville, New Albany, Ind., Louisville, Paducah, Ky., and Cincinnati, O., also to points in Illinois and Indiana, to apply only on shipments transported in open top cars. Exception: Will not apply in connection with rates published in C. F. A. L. Tariffs 100–AA and 104—Q, Agent Sperry's I. C. C. No. 218.

38784. To establish on **sand,** viz., lake, river, bank, other than sand loam, carload. to Casey, Ill., from Calumet, Gary and Willow Creek, Ind., 170c per net ton, being proposed rate. Present rates, from Calumet, Ind., combination; Gary, Ind., 20c (sixth class); Willow Creek, Ind., combination. Route: Via Wabash Ry., Lakeville, Ind., P. R. R.

38803. To cancel all rates on **sand, gravel, slag and stone** as per Groups A, B, C and D, shown below, published in B. & O. (B. R. & P.), Tariff I. C. C. 8337, from Ellwood City, Rock Point, Chewton, West Pittsburgh, New Castle, Mahoningtown, Bessemer and Pittsburgh, Pa., to destinations in Ohio, Pennsylvania, New York and Canada, Classification basis to apply in lieu thereof.

Representative Destinations

Erie, Ansonia, Sagamore, Pa., Conneaut, O., Brixment, N. Y., Hamilton, Ont., Montreal, Que., Welland, Ont.

Sand—Group "A"

Blast, core, engine, fire, foundry, glass, grinding, loam, moulding, quartz, silex or silica, C. L. (Cancellation to be made from Bessemer, Chewton, Ellwood City, Mahoningtown, New Castle, Pittsburgh, Rock Point and West Pittsburgh, Pa.)

Sand—Group "B"

Other than described in Group "A" and gravel, C. L., same minimum weight as shown in Group "A." (Cancellation to be made from Chewton, Ellwood City, Mahoningtown, New Castle and Rock Point, Pa.)

Slag—Group "C"

(A product of iron or steel blast or open hearth furnaces), not ground or pulverized, in bulk, in open top equipment, C. L., same minimum weight as shown in Group "A." (Cancellation to be made from Chewton, Mahoningtown, Ellwood City and Rock Point, Pa.)

Stone—Group "D"

Crushed, crushed stone screenings and crushed stone tailings, carloads, same minimum weight as shown in Group "A." (Cancellation to be made from Chewton, Mahoningtown and New Castle, Pa.) Also cancel rates on limestone, ground or pulverized, agricultural, carloads, from Rock Point, Pa.

38805. To establish on **gravel,** C. L., from Cuyuga, Ind., rates in cents per net ton:

To	Pres.	*Prop.
Ramsey, Ill.	101	81
Bayle, Ill.	113	93
Bingham, Ill.	113	93
Fillmore, Ill.	113	93

*To expire with July 31, 1934.

38816. To establish on **sand, and gravel,** C. L., as described in I. C. R. R. Tariff No. 13321–G, from Riverton, Ind., to Bedford, Ind., rate of 86c per N. T. Route via I. C. R. R., Switz City, Ind., C. I. & L. Ry.

38818. To establish on **stone, crushed** (in bulk), and **crushed stone screenings** (in bulk), in open top cars, C. L., from Spore, O. (rates in cents per net ton):

To	Proposed	Present
Lexington, O.	80	(1) 90
Butler, O.	85	(1) 90
Hunt, O.	90	(2) 95
St. Louisville, O.	95	(2) 95
Vanatta, O.	100	(2) 95
Thomville, O.	100	(3) 105
Walser, O.	100	(3) 105
Yost, O.	100	(3) 105
Gobles, O.	105	(4) 115

(1) Intermediate to Mt. Vernon.
(2) Intermediate to Newark.
(3) Intermediate to Somerset.
(4) Intermediate to Shawnee.

Tariff authority—N. Y. C. Tariff I. C. C. L. S. 1779.

Southern

4068. **Granite and stone, crushed or rubble, and screenings, granite and stone,** C. L., Greystone, N. C. (S. A. L. Ry.), to Baltimore, Md., and Philadelphia, Pa. At present, combination rates apply. It is proposed to establish rates on granite and stone, crushed or rubble, and screenings, granite and stone, C. L. (See Note 1), except when cars are loaded to their visible capacity, actual weight will govern, from Greystone, N. C. (S. A. L. Ry.), to Baltimore, Md., 252c; Philadelphia, Pa., 302c per net ton.

4095. **Soapstone or talc,** crude or ground, C. L., Spruce Pine and Penland, N. C., to East Point, Lakewood Station, Oakland City, Fort McPherson, and Ormewood Station, Ga. It is proposed to establish rate on soapstone or talc, crude or ground, in straight or mixed carload, minimum weight 50,000 lb., from and to the above named points, 360c per net ton. Same as approved under Submittal No. 57561 to Atlanta, Ga.

Southwestern

2819. **Silica sand,** from Everton and Guion, Ark., to Kansas City, Mo.–Kan. Establish rate of 168c per ton of 2,000 lb. on silica sand in box cars described in Item 7, S. W. L. Tariff 162–F, from Everton and Guion, Ark., to Kansas City, Mo.–Kan. Reduction of 25c per ton is being proposed to meet similar reduction from Klondike, Mo., effective February 1, 1934, in Supplement 9, M.–K.–T. Tariff 3407–M, in order to observe the present relationship among these competing points.

Illinois

5792–S–1. **Crushed stone and agricultural limestone,** C. L., usual minimum weight, from Pontiac, Ill., to Effner, Gilman, Eureka, Peoria, etc., Ill. Proposed rate, $1.01 per net ton.

7676. **Sand, gravel, chert, slag, stone, crushed, rubble and broken,** in straight or mixed carload, Shawneetown, Ill., rates per net ton, to Eldorado, Ill., present, 63; proposed, 55. To Junction, Ill., present, 60; proposed, 50.

Western

2051. Rates, **stone, crushed,** C. L. (See Note 2), but not less than 40,000 lb., to Osceola, Neb., rates in cents per 100 lb., from Sioux Falls and Spencer, S. D., present 15, proposed 13.5.

2292. Rates, **stone, crushed,** C. L. (See Note 1), from Ely, Minn., to South Bend, Ind. Rates, present, (a) $4.21 per ton of 2,000 lb. Proposed, $3.33 per ton of 2,000 lb. (a) Combination over Chicago.

8561. Rates: **Stone, crushed,** C. L. (See Note 3). In no case shall the minimum weight be less than 40,000 lb., from Wausau, Wis., to St. Louis, Mo., E. St. Louis, Ill., and Vandalia, Ill. Rates: Present—15½c per 100 lb. Proposed—250c per net ton.

8561–2. **Stone, crushed,** C. L. (See Note 3). In no case shall the minimum weight be less than 40,000 lb., from Wausau, Wis., to Marseilles, Ill. Rates, present, 215c per net ton; proposed, 180c per net ton.

I. C. C. Decisions

25407. Sand and Gravel. Reed and Wheelock vs. C. B. and Q., by Division 3. Case dismissed with the assertion that the sand and gravel rates from Oreapolis, Neb., to Prescott, Ia., are not unreasonable.

25686. Phosphate Rock. By Examiner John McChord. Etheredge Guano Co. vs. A. C. L., et al. Rates from Florida points to Augusta, Ga., were found not unreasonable or otherwise unlawful.

24435. Talc. By the commission. New rates ordered established not later than January 18 from Hailesboro, Emeryville, Talcville and Natural Bridge, N. Y., to Sheldon Springs, Vt., on the basis of 22.5% of the first-class rate.

25571. Lime. Rockdale Lime Co., Inc., vs. B. & O., et al. By division 3. Dismissed. Rates, lime, Strasburg Junction and Linville, Va., to Charleston and South Charleston, W. Va., not unreasonable. Rates for the future and reparation were sought.

24945. Lime. Muscle Shoals White Lime Co. vs. A. G. S. et al. By Examiner C. J. Peterson. Rates, lime, Denie, Ala., to various destinations in Arkansas, Louisiana and Texas not unreasonable in the past but unreasonable for the future to the extent they may exceed the scales approved in I. the southwest.

25961. Molding sand. By division 5. Keener Sand and Clay Co. vs. N. Y. C. and St. L., et al. Rate from Shinrock, Ohio to South Bend, Ind., found unreasonable in the past to the extent it exceeded $2.20 per net ton, plus emergency charge; unduly prejudicial to the extent it exceeded competing rates from pits in Sandusky, Ohio, and related points. New rates to be established not later than March 15. Reparation of $203.80 awarded.

3871. Agricultural Limestone via Missouri-Illinois Railroad. By division 3. Proposed reduced rates from Bonne Terre, Mo., and other points in Missouri, to destinations in Illinois on the Missouri-Illinois Railroad, found not justified. Finding was that the carrier had justified rates from the Bonne Terre district of 78c to destinations on its main line as far north as Nashville, Ill., and to points on its Chester and Rosboro branches, and 81c to destinations on its main line as far north of Nashville as Centralia. Respondent proposed rates to points on its main line as far north as Nashville of 73c to points on its line as far north of Nashville as Centralia of 76c and to points on its Chester and Rosboro branches, of 73c.

Proposed I. C. C. Decisions

25953. Cement. Louisville Cement Co. vs. Pennsylvania R.R. et al. Examiner J. G. Cooper recommended that cement rates from Speeds, Ind., to points in Arkansas, Louisiana and Missouri, imposed on shipments between May 21, 1929 and September 13, 1931 be found unreasonable to the extent that they exceeded corresponding subsequently established rates. Reparation recommended.

Cement Fourth Section 14138 and others, propose the commission authorize railroads to continue or establish and maintain rates on cement, in carloads, and cement, portland, natural or hydraulic, in straight or mixed carloads, from, to, and between points in southwestern and western trunk line territories, without observing the long and short haul part of section 4, upon conditions, the chief of which appears to be the 70, 50 and 33⅓% circuity limitations. He recommends that findings made in formal docket decisions be ap-

propriately modified and fourth section orders heretofore granted in accordance with the findings be vacated. Affected cases are Iola Cement Mills Traffic Association vs. A. W. 87, I. C. C. 451; Oklahoma Portland Cement Co. vs. D. & R. G. W., 128 I. C. C. 63; and Iola Cement Mills Traffic Association vs. A. & V., 144 I. C. C. 585 and 148 I. C. C. 122.

25540. Bituminous Rock Asphalt. O. W. P. Macklin vs. I. C. et al. By Examiner W. M. C. Cheseldine. Dismissal proposed. Rates, bituminous rock asphalt, Rockport and Bowling Green, Ky., to Decatur, Ind., not unreasonable.

14794 and 14964. Crushed Stone or Marble, from and to south. Recommends that applicants be granted authority to establish and maintain rates on crushed stone or crushed marble (terrazzo aggregate), in bulk or in bags, in box cars, and on crushed granite, in bags, in carloads, constructed on the basis prescribed or approved for application on the first-named commodity in the Stone, Marble and Slate Case, 183 I. C. C. 611, between points in southern territory, on the one hand, and points in trunk line territory (including Buffalo-Pittsburgh territory) and New England territory, on the other, over the same routes between these points over which first-class rates established pursuant to the Southern Class Rate Investigation apply, and to maintain higher rates from and to intermediate points, which shall not exceed rates constructed on the basis prescribed or approved in stone, marble and slate case, or the lowest combination of rates subject to the interstate commerce act.

20828. Molding Sand. Lebanon Steel Foundry vs. Pennsylvania R.R. et al. Examiner John J. Crowley, upon further hearing, recommended a finding that the complainant made molding sand shipments between Pennsylvania points under rates found unreasonable in the original report on Industrial Sand Cases, 1930. Reparation recommended in the amount of the difference between charges paid on 449 shipments made between March 30, 1926 and October 4, 1932, and those which would have accrued at the rate of $1.80 per ton—the total reparation recommended being $7,531.81, with interest.

25245, Crushed Stone. Hiddenite Granite Co. vs. Yadkin et al. Rates, crushed stone, from North Carolina to Virginia and South Carolina points, between North Carolina points moving interstate and from Tennessee points to North Carolina points, except on shipments moving over the Atlantic & Yadkin, were, are and for the future will be unreasonable to the extent they exceeded, exceed or may exceed the single line scale prescribed in Rates on Chert, Clay, Sand, and Gravel, 122 I. C. C. 133, subject to the authorized emergency charges on and after January 4, 1932. Complainant and intervener entitled to reparation.

Crushed Stone Rates High

RATES MAINTAINED by railroads engaged in the intrastate transportation of chat, crushed stone, gravel and sand, between Kansas points with few exceptions exceed rates previously determined. This is the finding of the Kansas Corporation Commission after a thorough investigation of joint rates and charges in connection with the intrastate movement of aggregates.

The commission claims that intrastate rates maintained by carriers of these commodities in carloads from points in Cherokee county, Kansas, to destinations in other parts of the state, other than Columbus, are and for the future will be unreasonable to the extent that they exceed or may exceed the rates prescribed from Columbus, Kan., on the same commodity to the same destination plus 6c per ton of 2,000 lb. The commissioners noted that where lower rates between specific points have been authorized since this proceeding was instituted, or are now maintained by railroads, such rates should be continued until they expire by limitation or until the work for which they were established is completed.

Two-Base Sand Rate

A TWO-SCALE foundation for rates on industrial sand and related commodities in official territory, including applications in Wisconsin and the upper peninsula of Michigan, has been proposed by Examiners Burton Fuller and Philip S. Peyser of the Interstate Commerce Commission.

Scale A is to apply on ground or pulverized sand. Scale B is to apply on core sand from New England and on naturally bonded moldig sand from New York, New Jersey and Ohio districts for all distances in both open and closed equipment. It also is to apply on silica sand and the so-called "border line" sand in closed equipment for all distances—and in open equipment for distances in excess of 300 miles. The carload minimum in connection with silica and tripoli is to be 60,000 lb. and the minimum in connection with the other rates proposed is to be 90 per cent of the marked capacity of the car except when the car is loaded to full visible capacity, actual weight shall apply.

Boiled down, the main finding is that on the other traffic on which the rates are assailed as unreasonable, reasonable maximum rates for the future will be afforded by the scales set forth in a complicated and lengthy appendix to the report proper. Briefly, Scale A begins with the rate of 100c per 10 miles, goes to 190c for 100 miles; 240c for 200 miles; 280c for 300 miles and on up to 700c for 1500 miles, a net ton. Scale B begins with a rate of 90c for 100 miles and graduates to 550c for 1500 miles.

Gravel Toll Upheld

THE public service commission of Louisiana, by reversal of a previous order, now approves the collection of the eight-cent-a-ton crossing charge on gravel and other highway materials between the east and west banks of the Mississippi river. This fee is in addition to the regular mileage rate charged on trans-shipments.

P. A. Fryer, secretary of the commission, states that the decision may reduce shipments from the east side of the river, and increase the traffic from west side pits. Baton Rouge and New Orleans are the principal toll points.

Brief on Sand Rate

ASSERTING the rate of $2.70 per net ton on sand shipped to its mines and washeries in Schuylkill, Columbia and Northumberland counties, Pennsylvania, from Jersey points to be unreasonable and excessive, the Philadelphia and Reading Coal and Iron Co. asks reparation and a downward revision of rates in its brief filed with the Interstate Commerce Commission.

Large quantities of sand are used annually by the company, the brief explains, in the cleaning of coal for shipment.

Court Reverses Minnesota Commission's Rate

DISTRICT JUDGE WALSH reversed recently a Minnesota Railroad and Warehouse Commission order establishing gravel hauling rates between the Twin Cities and Spring Valley. The rate of 4c a 100 lb. approved September 6, 1932, by the commission was held "discriminatory" by Judge Walsh. Plaintiffs were Foley Bros., Inc., and the Lieb Stone Co. of St. Paul and the Winona Sand & Gravel Co. of Winona. They contended discrimination, asserting that gravel is hauled from Spring Valley to Preston, a distance of 26 miles, for 3c a 100 lb. as against 4c a 100 lb. from Spring Valley to the Twin Cities, a distance of 126 miles. The 4c rate was granted to the Hallett Construction Co. of St. Paul and the Chicago Great Western Railway Co.

Reduce Illinois Gravel Rate

THE Illinois Commerce Commission recently gave permission to the Illinois Terminal R. R. and the Rock Island Lines to reduce sand and gravel rates to meet truck competition. The Illinois Terminal's new rate of 56c a ton is effective between Lincoln, Mackinaw, Peoria and Alton to Auburn, Belt Siding, Chatham and Woodside.

Portland Cement Yardage

AWARDS of concrete pavement for January, 1934, are announced by the Portland Cement Association as follows:

	Sq. yd. awarded during January, 1934	Sq. yd. awarded to date, Feb. 3, 1934
Roads	2,130,510	2,130,510
Streets	1,770,780	1,770,780
Alleys	19,654	19,654
Total	3,920,944	3,920,944

Crushed Stone

Tennessee Valley Authority headquarters in Knoxville, Tenn., received sixteen bids February 7, for structural material required for the new crushing and screening plant to be erected at Norris dam. At the same time bids were opened for concrete mixing equipment.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Concrete Institute Convenes

Relation of Aggregates and Cement to Durability of Concrete Among Subjects Reviewed at Toronto in February

THE THIRTIETH annual convention of the American Concrete Institute, held for the first time on foreign soil, at Toronto, Canada, was characterized not only by an unusual attendance, 384, but by a series of papers clearly demonstrating the activity of the best minds in the industry during 1934. The meeting at Toronto the day previous to the A. C. I. convention opening, and on February 20 in conjunction with it, was that of the National Concrete Masonry Association and the Concrete Products Association of Canada.

Ten Aggregates Studied

Two papers of unusual interest presented the first day were "Durability Studies of Concrete and Aggregates," prepared jointly by Inge Lyse and J. M. Holme of Lehigh University, and read before the Institute by Mr. Lyse, and a paper, "Does Cement Protect a Poor Quality Aggregate? Yes and No," prepared and delivered by E. Viens, Director of Testing Laboratories, Department of Public Works, Ottawa. Mr. Lyse's conclusions after studying a total of 10 aggregates consisting of six natural sand and gravels, three types of crushed limestone, and one type of crushed ore and steel punchings, were that the natural sand and gravel aggregates produced a more durable concrete than did the limestone aggregates included in the investigation.

It was also his conclusion that the durability of concrete is a problem of economics and can be obtained by the use of either high grade aggregate in good quality cement paste, or by a lesser grade of aggregate in high quality paste, or by the use of low quality paste with long curing or high quality paste with short curing. Mr. Viens stressed the point that in some cases aggregate not good for 2,000-lb. concrete might be suitable for 3,500-lb. concrete because of the increase in quality of the paste. It was his experience that certain aggregates used in 2,000-lb. concrete might cause the concrete to fail within a comparatively few years if used in exposed structures, while the same aggregate used in unexposed structures with concrete of 3,500 or 4,000-lb. would give entire satisfaction.

He observed that on the other hand there are aggregates which might cause trouble leading to even total failure in spite of the cement paste that would yield a concrete of 3,500 to 4,000-lb. per square inch.

Precast Joists

An interesting presentation was also made the first day by R. E. Copeland, engineer, Portland Cement Association, recounting tests on seventeen 4 by 14-ft. floor panels designed for residence and other light loading. This study, undertaken to determine the adequacy of precast concrete joist floor construction, was conducted by Mr. Copeland in conjunction with P. M. Woodworth of the association staff and presented particularly the co-action between the precast joists and the slabs cast in place on them.

An architectural session was held the first evening and carried as its subject, "Concrete as a Medium of Architectural Expression in Buildings," by Alfred Chapman of Toronto.

In the absence of Walter T. Steilberg, Berkeley, Calif., his paper on "Architecture of Reinforced Concrete Structures," containing an analysis of the effect of concrete structural methods on architectural design and a discussion of the possibility of reinforced concrete as a medium of architectural expression, was given by Arthur R. Lord, newly elected president of the Institute. John J. Earley of Washington, this year's winner of the Henry C. Turner gold medal, presented intimately the methods used in designing, casting, finishing and erecting the dome covering of the Bahai Temple at Wilmette, Ill.

Effect of Temperature on Concrete

The third session of the Institute was devoted entirely to temperature effects on concrete strength and problems involved in cold weather construction. H. F. Gonnerman, in the absence of A. G. Timms and N. H. Withey, presented a paper prepared by them giving the results of a laboratory investigation on the strength of concrete from both normal and high early strength cements exposed for various periods at temperatures of fifty, thirty and sixteen degrees Fahrenheit. This paper brought out in a striking manner the importance of the duration of the period of initial curing, indicating that when the temperature of exposure is from 33 to 50 degrees Fahrenheit, the initial curing period of 70 degrees should be at least three days for normal cement and one day for high early strength cement. For concrete exposed to temperatures below freezing, the strength at any time after the period of initial curing depends primarily on the strength developed during this initial curing period.

R. B. Young and Wilfrid Schnaar of the Hydro-Electric Power Commission of Ontario, presented respectively two papers, each the joint work of the two men mentioned. One was on the "Principles of Heating Concrete Mixtures in Cold Weather," presenting a brief analysis of the problems involved, and the second, "Cold Weather Protection of Concrete," a sequel to the first, discussed protection at the time of placing, different degrees of protection required, the insulating value of various form materials, and the types of construction.

The final session of the Institute, devoted to rigid frame construction, had as its speakers F. E. Richart, research professor, University of Illinois, who presented "The Effect of Plastic Flow in Rigid Frames of Reinforced Concrete.

For the past two years T. D. Myerea, Professor of Building Construction, Carnegie Institute, Pittsburgh, has been conducting tests upon a series of T-beams, hoping to shed light upon problems of the Institute's committee on Standard Building Code in relation to bond, anchorage, and shear. The results of these tests were presented in a paper at this session. H. S. Van Scoyoc of the Canada Cement Company, Montreal, gave an unusually interesting paper outlining the present tendencies in Canadian railway bridge design. He was followed by Arthur Sedgwick, Bridge Engineer, Ontario Department of Highways, whose paper, as well as Mr. Van Scoyoc's, recorded distinct advances in bridge design and construction, not only from the standpoint of economy but from that of utility and greater service.

Arthur R. Lord, consulting engineer of Chicago, was elected president of the Institute for 1934. Harvey Whipple of Detroit, was retained as secretary-treasurer.

Open Price Selling*

By Rolland J. Hamilton,
President, American Radiator Co., New York, N. Y.

IN this article the term "open price policy" is used in its literal sense. An open price policy is one under which prices, by whomsoever quoted and to whomsoever quoted, are out in the open. During our generation the great retail stores have become leading exponents of this policy. They have one price for each given article and that price is open to every prospective purchaser. So much is this true that these stores employ shopping scouts whose business it is to ascertain the prices asked for various articles of merchandise by competitors; and thereby the practice becomes one not only of open price to the buyer but to the competitor as well. We are aware of no contention that this policy is other than for the best interests of the merchant and the consumer alike.

The mail-order or catalog house is, in its very nature, an exponent of this policy. When a mail-order house publishes its catalog, it tells the world, including its competitors, the prices asked for the listed commodities.

The selling practices of our manufacturing institutions and wholesale houses, however, have been for the most part more devious and more complicated. An enormous waste of time and money is involved in the continued efforts of sellers and buyers to learn the lowest prices current in their particular markets and in the dickering necessary to obtain or place orders. Salesmen and purchasing agents become sleuths searching for that lowest price. From these practices has arisen a chain of evils incalculable in their scope. Price discrimination, secret rebates and unfair methods of competition have inevitably followed.

The so-called open price association as we have known it for the past twenty years has been one in which the members of a given industry—usually a manufacturing industry—through trade association cooperative endeavor—have sought through orderly processes to lessen the baneful effects of disorderly price practices. As the Sherman Law was interpreted by court decision (and especially after the so-called "Rule of Reason" was read into it) there grew the conception that, although competitors might not agree upon prices or even discuss them in advance, nevertheless it was not illegal for them to file some record of transactions—after the fact—with a trade association.

We cannot say who devised this plan—perhaps it was an evolution of thought—but to the best of our knowledge its crystallization into actual trade association practice was the work of Arthur J. Eddy, a Chicago lawyer, whose book on this subject became authoritative a good many years ago. This entire principle was attacked severely as a violation of the anti-trust laws, but some eight or ten years ago definite approval was given by the Supreme Court of the United States to this trade practice procedure, provided it literally dealt only with consummated sales.

From approximately 1912 to 1920, price reports handled by trade associations were more specific and detailed than they have been since that time. A distinction has been drawn between reports of closed and consummated sales on the one hand, and quotations on the other. Reports of closed sales have been definitely sanctioned by the United States Supreme Court, but reports of quotations have not been specifically and definitely approved.

Reports Through Associations

When quotations were used by trade associations, necessarily they were reported and disseminated instantly, when and as made; competitors would promptly know what quotations they were called upon to meet. These reports contain terms, conditions, names of customers, and all details, and were distributed by telegraph, or otherwise, as agreed. Reports of closed sales were handled in the same manner, with variations in individual instances. For example, in order to avoid the duplication that might exist if reports of every transaction were distributed, the reporting plan usually provided that price lists be filed and that subsequent quotations or closed sales that were lower or at variance with current price-lists be reported. In the absence of price-lists, especially if the products of the industry were not standardized and the use of price lists was not feasible, the same objective was accomplished by the filing of all outstanding and existing quotations. Thereafter, the members would report only quotations that were lower or at variance with their current existing quotations.

When reports have been restricted to those of closed sales—and that has been the custom very generally during the last twelve or thirteen years—two main methods have been followed. These have been (1) reporting all such sales and distributing them daily, weekly, or monthly as arranged, or (2) filing price-lists and reporting and distributing when and as any individual sale was made at variance with the current price-lists. There have been two obstacles in handling these reports, one practical and the other legal. Generally, sales are too numerous to make a report of every transaction. In fact, such procedure would be of no value and would be unnecessarily expensive. Legal authorities have claimed that filing such lists and reporting only sales made at lower than the list price implies an agreement to adhere to the list prices. Actually, it is merely an announcement by each member of his published list prices, with the unqualified right to make any other price at any time he may so decide.

Such have been and are the methods of collecting and distributing price reports through a central bureau. When functioning, it becomes routine and systematic. Such reports have naturally narrowed the competitive spread in prices, and also prevented both unreasonably low and unreasonably high prices.

It is true that this principle is rejected by many executives and lawyers, in some cases because it really does not fit particular industries; in others because there still remain doubts of legality; but perhaps in a majority of the cases because the workings of the plan are not understood. But let the past be as it may, the National Recovery Administration has definitely recognized the open price policy and the establishment thereof collectively by members of an industry through a Code of Fair Competition.

Effects of Open Price Policy

Such a policy established by all the members of an industry, and enforced, puts the full responsibility upon each individual seller for destroying his own market, if he does not adopt and follow the open price principle. It gives him the one thing he needs to establish an economically fair price for his goods and at the same time protects the buyer and the consumer. It preserves the freedom of individual action in pricing one's own goods. It prevents discrimination in price between customers and operates against arbitrary or unreasonably high prices.

This means in net effect that it is better, wiser and more businesslike for men to act out of full knowledge than out of ignorance; that the public announcement of price schedules does not restrain trade, and that it is not a crime for one to learn the prices at which his competitor is selling his goods. If such be not in the public interest, then ignorance should be exalted as the patron saint of business.

Towards Uniform Prices

Observance by all sellers in an industry of openly published prices tends necessarily towards uniform prices, because knowledge on the part of everyone dealing in a particular market inevitably narrows the competitive spread. Competition backed by adequate productive capacity is a sure safeguard against unreasonable prices when the indi-

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vidual is free to put into effect at all times a lower list of prices. Prices do become reasonably uniform and stable by and through competition when all prices are brought out into the open. The United States Supreme Court has said in two important decisions that the reporting of prices through an association does tend to uniformity; but the court has approved such a practice as fair and equitable both legally and economically.

The NRA is not opposed to increased prices, commensurate with increased cost, nor to the making of reasonable profits. For obvious reasons it is opposed to price fixation. A policy permitting direct price fixation by industry would, in our opinion, be a serious blow to industry itself. Codes are daily being approved requiring members of an industry to file individual price-lists with an association or agency. The anti-trust laws prohibit agreement between competitors to adhere to their respective price-lists filed with an association; obviously this has been a deterrent to spread of open price association practice in the past. The NRA sanctions and encourages provisions that require all members of a given industry to file their individual price-lists. In addition, the NRA makes it an unfair trade practice for any member of an industry directly or indirectly to sell products at prices other than those stated in the price-lists so filed. Furthermore, codes have been approved providing that the Code Authority, with the approval of the Administrator, may require any member of an industry operating under open price provisions to submit cost data and other information in support of a revised lower price-list, and, if not justified, that such price-list be withdrawn and another price-list filed containing prices not lower than the lowest prices listed by any other member of the industry.

We feel the highest degree of confidence that the greater familiarity with open price practices and the working out thereof on the part of the industry at large, operating under NRA, means a tremendous step forward in price stabilization and elimination of unfair trade practices.

Lime Consumption Actually Increased in 1933

Preliminary Estimates Show One Rock Products Industry Already Well Started on Upgrade

THE sales of lime in 1933 by producers in the United States amounted to 2,224,000 short tons, valued at $14,006,000, according to preliminary figures furnished by lime manufacturers to the U. S. Bureau of Mines. This is an increase of 13.5% in quantity and 13.8% in value compared with sales of 1,959,990 tons valued at $12,302,231 in 1932, and follows a decrease of 28% in quantity and 34% in value in 1932 compared with 1931. The average unit value per ton in 1933 was $6.29; in 1932 it was $6.28. The total sales of lime in 1933 include 822,000 tons of hydrated lime valued at $5,512,000, a decrease of 3.6% in quantity with increase of 2.6% in value as compared with 1932 (852,251 tons valued at $5,370,273). The average value per ton of hydrated lime in 1933 was $6.71; in 1932 it was $6.30.

Producers, even in the same districts, reported great variations in demand for all classes of lime. In general, demand for building lime was small with prices low until the last quarter of the year when both demand and prices increased somewhat. Better realizations were obtained for hydrated lime than for quicklime. Chemical lime (which for statistical purposes include metallurgical and refractory lime), influenced largely by activity in iron and steel and the chemical industries, was in good demand in some regions, but demand was small in markets where chemical manufactures were less active. Low prices prevailed with slight increases toward the end of the year. The demand for agricultural lime was generally dull and irregular and prices were low.

Sales of lime in 1933 for construction are estimated at 507,000 tons compared with 596,825 tons in 1932, a decrease of 15%. This followed a decrease of 37% in 1932 from the 1931 production. Sales of lime for chemical uses are estimated at 1,486,000 tons, an increase of 33% over 1932 (1,118,591 tons). These figures include 252,000 tons of dead-burned dolomite, an increase in this commodity of 86% over the output (135,733 tons) for 1932. Exclusive of dead-burned dolomite the estimated sales of chemical lime in 1933 was 1,234,000 tons, an increase of 26% over the corresponding sales (982,858 tons) in 1932. The sales of lime for agricultural use are estimated at 231,000 tons, a decrease of 6% in 1933 from 1932 (244,574 tons) and followed a decrease of 18% in 1932 from the 1931 figures.

The accompanying table compares the estimated sales of lime in 1933, by states, with the sales in 1932. (*See tabular matter referred to in third column.*)

Figures of exports and imports of lime for 1933 as compiled by the Bureau of Foreign and Domestic Commerce are available for 11 months only and are as follows: Exports, 3,292 short tons, value $50,629; general imports (exclusive of dead-burned dolomite), 8,449 short tons, value $96,035; imports of dead-burned dolomite, 1,067 short tons, value $10,400. These figures are subject to revision.

LIME SOLD BY THE PRODUCERS IN THE UNITED STATES IN 1932 AND 1933

	1932		
	Total lime		Hydrated lime
State	Short tons	Value	(short tons)
Ohio	475,485	$2,511,368	292,742
Penna.	374,244	2,327,131	152,095
Missouri	174,427	1,034,850	71,785
West. Va.	82,757	427,241	31,986
Tennessee	106,706	496,200	27,403
Alabama	92,359	492,248	19,493
Illinois	62,436	450,033	20,030
Virginia	78,771	435,085	27,968
Indiana	58,440	351,240	34,023
Mass.	68,959	527,305	22,870
Michigan	38,610	267,520	(1)
California	29,925	284,467	9,238
Texas	35,903	340,859	23,917
Vermont	29,187	207,032	6,467
Wisconsin	27,283	209,868	7,182
Maryland	26,536	171,312	16,385
Other	197,962	1,768,472	88,667
Total	1,959,990	$12,302,231	852,251

[1]Included under "Other."

	1933 (estimated)		
	Total lime		Hydrated lime
State	Short tons	Value	(short tons)
Ohio	524,000	$3,213,000	255,000
Penna.	430,000	2,790,000	138,000
Missouri	225,000	1,117,000	90,000
West. Va.	121,000	628,000	29,800
Tennessee	119,000	575,000	28,000
Alabama	112,000	557,000	18,000
Illinois	83,000	527,000	25,000
Virginia	82,000	451,000	35,000
Indiana	63,000	338,000	28,300
Mass.	55,000	465,000	21,700
Michigan	44,000	277,000	9,500
California	37,000	353,000	13,500
Texas	35,400	340,000	21,100
Vermont	29,500	209,000	8,800
Wisconsin	27,100	178,000	7,100
Maryland	26,000	160,000	14,000
Other	211,000	1,828,000	79,200
Total	2,224,000	$14,006,000	822,000

Lime Requirement Totals 5,200 Tons a Year

FIVE GRAINS of lime per gallon of water treated is required at the new Mahoning Valley Sanitary District water purification and softening plant. The plant serves the cities of Youngstown and Niles, Ohio, and has a daily capacity of 40,000,000 gal. per day. The amount of lime consumed is better than 14 tons per day, or 5200 tons per year. The population served is about 200,000. A description of the new plant by G. Gale Dixon, consulting engineer, Youngstown, Ohio, is published in *Engineering News-Record*, March 30, 1933. If city populations of 20,000,000 were served in a like manner, which is a conservative estimate of those who would profit by similar plants, the yearly demand for lime for this purpose alone would exceed half a million tons.

Glass Container Affects Acidity of Rain Water

IN CONNECTION with a study of the decay or disintegration of building stones the (British) Building Research Board is making measurements of atmospheric pollution. Rain water is collected at two widely separated points and is analyzed each month.

It was noted that the water collected in these rain gages became more acid each month, and it is presumed that the alkalinity of the earlier samples was due to the extraction of alkali from the glass vessels.

Evaluation of Sand Deposits*

One Factor Often Overlooked—The Character of the Sand Grains—Notes on Purification of Glass Sand

By E. Wayne Galliher

WHEN AN EVALUATION of a sand deposit is made, the cost data and profit prospectus are ordinarily based on such factors as the extent of the deposit, its overburden, the uses for the sand, the size of the market and its location, transportation costs, prevailing prices, proposed methods of excavating and treatment, and so on. Most of these factors are easily determined. A tremendous literature relating to them is already in existence.[1]

There is, however, one factor which is often overlooked, and with very disastrous results. That factor is the mineralogy of the sand grains themselves.

Presumably the neglect for its consideration is due to its apparently trifling character and to the fact that careful, laborious, microscopical work is essential to get the data.

For California sands, and especially for so-called high-silica sands, the mineral make-up of the individual grains is of paramount importance when determining the uses for the sands. In one well known case a new plant was unable to produce the grade of sand originally planned for. This was because the plant had not been laid out to treat a sand whose grains had a peculiar make-up. The plant alterations that were subsequently made were costly and, perforce, were such that the lay-out was very inefficient.

Some of these idiosyncrasies of our California sands, and of sands in general, are discussed in the following paragraphs.

Status of Size Separation and Mineral Separation

Modern screening practice enables a separation of grain sizes within narrow limits. Sometimes screening methods are combined with those which accomplish separation by settling the sand in water. Occasionally hydraulic water is used; that is, the grains are sized by rising currents of water.

As the sizing processes are applied to grains of smaller and yet smaller dimensions, they are overlapped by methods which utilize rising air currents to accomplish separation of the grains. Modern air separation systems have reached a very high point in efficiency.

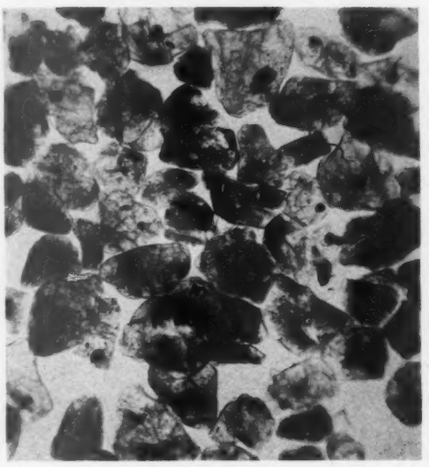

Fig. 1. Photomicrograph of composite sand grains from an arkose. The transparent grains of quartz and feldspar contain small crystals of biotite (black mica). x 16

Mineral separation, however, is equally as important to sand technology as grain size separation. Flotation methods are becoming more and more important in the nonmetallics field. They are especially valuable in the phosphate rock industry. Flotation research is now concerned with the separation of quartz from feldspar, and anything accomplished on this project will be useful in the development of California arkoses; that is, white sands containing practically only quartz and feldspar grains, and commonly derived from granitic rocks.

The advent of the high-intensity magnetic separator should be welcomed in the sand business. It offers a ready means for accomplishing separation from the high-silica sands the obnoxious and unwanted micas, ferromagnesian minerals (such as hornblende, augite, etc.), and some of the other concentrates or "heavies."

Compound Mineral Grains

Separation of the different mineral grains is not, in itself, the only goal. There exists in many of the high grade sands a class of grains which are made of two or more minerals. Unfortunately, one of the minerals is usually a detrimental one. It becomes the obnoxious mineral *par excellence* principally because it is so intimately associated with the valuable one.

Fig. 1 shows an assemblage of sand grains from a California arkose. Crystallized within the individual quartz or feldspar grains are small crystals of biotite (black mica). Composite grains such as these remain after being processed through the high-intensity magnetic separator. Their presence makes the sand practically useless for such a purpose as glass mix.

Grinding Effect

The elimination of the composite grains can be partially accomplished by two steps: rough grinding, followed by a second magnetic separation. The grinding step produces, in the majority of cases, a cracked or broken grain from which the smaller kernel of biotite is removed when subjected to the second magnetic separation. The process is analogous to shelling nuts.

Zircon Crystals

Fig. 2 shows a portion of Fig. 1 at greater enlargement. However, it shows not only the included biotite but also minute crystals of zircon. So far, no method has been developed to completely eradicate troublesome grains such as these.

In Fig. 3 are shown more grains of the same sand which are polluted with two other obnoxious compounds. The feldspar grain showing cleavage is stained along the cleavage cracks with carbonaceous matter. The other grains, which are essentially chalcedonic, are flecked with minute particles of hydrotroilite, a compound with the probable composition $FeS(H_2O)_x$. Neither of these types of grains is affected by high-intensity

Fig. 2. A portion of Fig. 1 enlarged to show the compound mineral grains in more detail. In the large quartz grain containing several crystals of biotite there are also minute crystals of zircon. x 60

*Part of a more complete report on the sand deposits of California to be published by the California State Division of Mines, Ferry Building, San Francisco.

[1]See Thoenen, J. R., Economics of new sand and gravel developments. U. S. Bur. Mines Econ. Paper 7, 1929.
Thoenen, J. R., Prospecting and exploration for sand and gravel. U. S. Bur. Mines Information Circular 6668, 1932.
Weigel, W. M., Technology and uses of silica and sand. U. S. Bur. Mines Bull. 266, 1927.

magnetic separation. The carbonaceous grain is not especially detrimental to the sand, but the presence of the iron-containing hydrotroilite endangers its use for glass mix.

Combination Processing

By the line sketches included in Fig. 4 are represented the compound grains found in the high-quartz sand of the Ione and Tejon formations of Eocene age. The deposits occur principally in the San Joaquin and Sacramento valleys. The kernels of ilmenite, magnetite, or rutile make the production of a high grade glass sand difficult but not impossible. The acid treatment which is used to remove the limonite cement found in these sands has but little effect on the iron content due to these mineral kernels. The combination of magnetic separation, coarse grinding and acid treatment offers the means for processing.

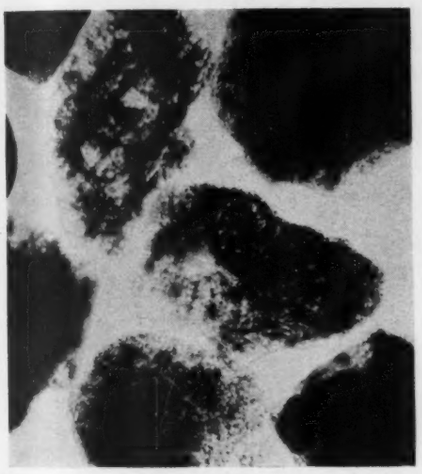

Fig. 3. Photomicrograph of feldspar and chalcedony grains from a white arkose. The large feldspar grain in the upper left corner is stained along the cleavage cracks with carbonaceous matter. Disseminated through the other grains are small particles of hydrotroilite. x 60

Structural Sands

The petrographic examination of the general run of structural sands is seldom necessary. It may save time, however, when the compression strength of a large number of sands is being determined. Physical tests require a fairly large amount of time. Considerable of that is saved when an estimation of the strength of a sand can be made upon the basis of a simple mineral examination. The relationship between strength and mineral make-up when once determined is fairly constant and quite reliable.

Summary

The mineral examination of a sand is an essential factor in the evaluation of the deposit. Several problems are being solved by the application of mineralogy to sand technology.

Rock Dust for Coal Mine Explosion Prevention

RECENT explosion tests on coal dust in the U. S. Bureau of Mines experimental mine at Pittsburgh (1925 to 1932, inclusive) confirm previous results that the increased effectiveness of rock dust caused by increasing its minus 200-mesh dust from 50 to 100% was too small to justify the additional cost. In general, it was found cheaper to maintain an additional 2 or 3% of coarser dust permitted by the tentative specifications (of the Bureau of Mines and of the American Engineering Standards Committee). Also, there is an advantage in having some coarser dust present to lessen caking following moistening.

These statements are contained in Bulletin 369 of the U. S. Bureau of Mines, a 44-p. report just issued, bringing the results of its explosion tests to date. Other extracts from the report of interest to rock products producers are:

To summarize, the tests show that rock dust should contain 50% or more minus 200-mesh material, but the difference between dusts containing 50 and 100%, minus 200-mesh size is not enough to have great practical importance in rock-dusting commercial mines, so far as power to quench an incipient explosion is concerned. As a result of these tests it was decided that in future limestone dust of ordinary commercial size containing about 70% minus 200-mesh material would be used in the test work both as a matter of convenience and to lessen experimental errors in determining limits of explosibility of different coal dusts. This will necessitate the use of small correction factors when results obtained with the finer rock dust are compared with those obtained previously.

Other Characteristics of Rock Dust

Composition—Results of early tests with inert dusts of different compositions were reported in Bulletin 167, page 141. All data available in 1929 were summarized in Technical Paper 464, page 5. There has been no additional experimental work since Technical Paper 464 was issued. The tentative conclusion then drawn was that change of composition of inert dust unaccompanied by a change in physical character did not alter its power to extinguish coal-dust explosions so long as there was not more than 2% combustible material in it. This limit on combustible material was set for experimental purposes; rock-dusting specifications permit a maximum of 5%.

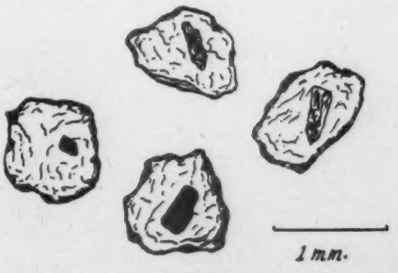

Fig. 4. Line drawing of composite grains from the Tejon high-silica sand. The grains represent quartz with inclusions of ilmenite or magnetite (lower left), and rutile (upper right)

It has been suggested at different times that gypsum would have special advantages as a rock dust because additional heat would be absorbed in liberating the combined water it contains. The Safety in Mines Research Board of Great Britain has reported experimental confirmation of this superiority in its regular communications to the Bureau of Mines. However, this advantage is offset by a tendency to cake when moistened, and it is inadvisable to use it in those mines which generally have a moist atmosphere.

Tentative Silica Standard

To reduce the causation of pulmonary diseases among miners the Bureau recommends tentatively that rock dust contains less than 25% free silica. Physiological tests have indicated that silicates may be harmful also. The effect of breathing silica and silicate dust is receiving much attention in various laboratory studies, but no final pronouncement has been made as to the limiting percentage that may be permitted in rock-dusting material.

Specific gravity—Gallery tests reported in Technical Paper 464, page 6, indicate that the apparent density of a rock dust has minor importance in determining its effectiveness in preventing propagation of an explosion. The weight of rock dust present and not the volume determines its effectiveness. On a weight basis diatomite (kieselguhr) dust, whose volume per unit weight is 4 to 6 times that of limestone and shale, was but slightly more effective in extinguishing explosions. A dust of low apparent density will be raised more readily to form a cloud, but the forces operating in propagation tests in the experimental mine are sufficient to raise the heavier limestone and shale dusts, and low density then has little importance. Results are different when the dust is used in barriers. There a compact mass of dust must be dispersed rapidly and the diatomite is more effective. The use of this almost pure silica dust in barriers is not objectionable from a health standpoint, as it is not dispersed in the mine air except in an explosion.

Color—The color of rock dust has no bearing on its effectiveness in extinguishing flame, but it is desirable that it be white or light colored so that continued deposition of coal dust during mining can be estimated by inspection. White dust improves illumination and therefore tends to reduce other types of mine accidents caused by poor lighting. Dark color may indicate the presence of combustible material in a mine dust and a dark dust should be regarded with suspicion until its composition is known.

Rock Products News Briefs

Crushed Stone

M. G. O'Neal and **Joseph Snyder** of New York, N. Y., have leased the state-owned quarry at Oglesby, Ga., at a qualified rental of $7,500 a year. It is said that the new operators recently had orders of 90,000 tons of crushed stone on hand and that approximately 200 men will be at work on regular operations after new machinery has been installed. Cleaning up the property already is in progress and the lessees are negotiating for formal NRA permission for regular production which presumably would begin in March.

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Cost of crushing stone as arrived at by the accounting system used for city-township crushing equipment, Pleasant Hill, Mo., is "about 30c a ton." Plans to continue the application of crushed stone to local residential streets, begun as a CWA project, are being considered in order to make use of existing equipment. Continuation of CWA funds on this and a multitude of similar projects throughout the country, however, is on an indefinite basis, particularly for the period after May 1.

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CWA quarry workers at the Odell quarry near Greeley, Ia., claim to have set "a new local record with production of 170 yd. of rock in one day." Sixty-three men have been employed working alternate five-hour shifts. Crushed limestone is sold to farmers at the quarry for 50c a ton. Highway pavements have been surfaced with the balance of the product, quarried from a side hill to a depth of 30 ft.

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R. Newton McDowell, Inc., Kansas City, Mo., has moved equipment to Glasgow, Mont., for operations on the Fort Peck dam. The $368,000 contract of this concern involves placing of 200,000 cu. yd. of boulders in two stock piles nearly 800 ft. long and 220 ft. wide. Part of the equipment now in use consists of nine trucks and two heavy-duty trailers. By the time the stock piles are assembled it is expected that 300 men will have been employed. **Tobin Quarries, Inc.,** Kansas City, Mo., have a contract for a third stock pile of the same size for assembly near Saco.

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Independent Gravel Co., Carthage, Mo., reports fire damage to its plant northwest of the city on February 2, is covered by insurance. Loss was estimated at $50,000. The destroyed plant, according to B. D. Reynolds, president, had a capacity of 400 tons of crushed rock and fine lime daily, and will be rebuilt to operate as the No. 1 plant of the company in connection with its No. 2 plant, a half mile away. With head offices in Joplin, the company also operates plants at Webb City, a tripoli plant at Racine and quarries at Hannibal and Phoenix.

County-managed crushing operations operate under no code, but Charles Atkins, owner of a rock deposit near Mound Valley, Kan., has definite ideas as to obligations of the county just as soon as it moves crushing equipment onto his land. Crushing operations were suspended on his property February 1, while he and the county authorities argued the fine point as to whether Mr. Atkins was to get 4½c a yard for rock just as it was taken from the ground or whether he was to get that for rock after crushing. The latter arrangement would mean that Mr. Atkins would get about 15 per cent more and that is the very thing, it seems, that Mr. Atkins wants.

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Macon County Lime Rock Co., recently incorporated, is making plans to develop its property immediately in the vicinity of Montezuma, Ga. C. H. Wheatley of Americus, and C. T. Harden of Oglethorpe have been in Atlanta in the interest of the company. It is understood that lime rock will be mined on a large scale and that the quality is suitable for road purposes. J. B. Easterlin, Jr., of Montezuma is president of the company; W. L. McKinzie and Watt Brown of Montezuma, vice-presidents; C. H. Wheatley is a director and C. T. Harden is director of sales.

Prices Bid

Cincinnati, Ohio: City Manager C. A. Dykstra reports the award of a cement contract for 1,000 sacks to a building supply company which bid 76.3125c a sack, less 2.5c for payment within 10 days following delivery. The low bid was said to be only a fraction of a cent under the next lowest.

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Lorain, Ohio: County commissioners have contracted for 2,000 tons of slag with the National Tube Co. at a reported price of $2,900. The slag is to be used in repair of several county-maintained roads.

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Indianapolis, Ind.: A contract to provide 8,500 yd. of gravel for a boulevard project recently was let by park commissioners to the American Aggregates Co. on a bid of $1,810. Of the gravel, 6,000 yd. was bought at 13c and 2,500 yd. at 40c. CWA labor is being used on the boulevard project.

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Pittsburgh, Penn.: County Commissioner Charles C. McGovern recently announced that because the nine concerns who had filed bids on ready-mixed concrete for CWA and other projects had failed to deny charges they had agreed on prices and allocated tonnage before bidding, he would disregard all of the bids. Prices range from $10.05 to $12.00 a ton for the concrete delivered in various parts of the county The companies were warned that despite any code provisions that they might be working under, such alleged collusive bidding was an action covered by the penal code of the state.

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Oswego, N. Y.: Bids were opened early in February by Commissioner of Works J. F. Gill for purchase of cement, sand and gravel, and the response showed identical bids of $2.49 per bbl. on all the cement involved. This figure was subject to the usual 10 per cent discount. Prices range from $1.80 to $2.00 per cu. yd. on the sand and gravel.

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Dayton, Ohio: The city commission recently announced low bids on crushed stone as follows: Frank Tejan, Dayton, bid $1.35, less 10c discount on 2,500 tons f. o. b. city yards, and $1.10 a ton for 2,500 tons f. o. b. the city's trucks. Laurel Gravel Co. bid $1.24, less 10c discount on 2,500 tons, f. o. b. city yards.

Sand and Gravel

Michigan Association of Portable Stone, Sand and Gravel Producers met in Grand Rapids in February for an informal discussion of the code, signed by President Roosevelt November 20. About 65 attended the meeting, including President J. V. Donahue of Ann Arbor; Vice-President Cornelius Marsman of Grand Rapids, and Secretary-Treasurer J. J. Riley of Detroit. Henry Battjes of Grand Rapids, is a member of the Wisconsin-Michigan regional code committee under which administration of the code is progressing so far as producers in Michigan are concerned.

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Consumers' Sand Co., Topeka, Kan., was held to be insolvent with $141,000 more liabilities than assets by Judge R. J. Hopkins, who recently approved findings of James A. McClure, assigned to investigate after filing of a petition by creditors.

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Thomas F. Brooks, purchasing agent for the City of San Francisco, Calif., has been ordered by the city's Chief Administrator Cleary to disregard all nine bids recently received from contractors seeking to supply the city with the 3,500 tons of gravel needed for projects during the next five months. The officials say they are particularly anxious to learn if the city is being charged higher prices for gravel than the prices charged private contractors. Last summer, after rejecting several gravel bids reported to be at a level of about $1.60 per ton, Purchasing Agent Brooks says that he bought gravel on the open market for approximately $1.25 a ton.

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Sand and gravel companies have joined with crushed stone and slag producers in

protesting proposed legislation pending at Albany, N. Y., designed to permit town boards of Erie and other counties to sell gravel or other materials taken from town board lands, and credit proceeds to township highway funds. "This legislation would permit the towns to sell material in competition with individual or corporation owned plants," said one aggregate producer in a formal letter of protest to Erie County authorities. "Our industry is faced, like many others, with an oversupply of material and we are now working under a code granted to us by the federal government which has certain provisions in it restricting erection of any stone plant or the opening of any new sand and gravel pits which would tend to increase the present excessive production."

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Cement

Statistics of the portland cement industry in January, 1934, show production of 3,779,000 bbl., shipped 3,778,000 bbl., in stock at the end of the month 19,541,000 bbl. Production in January, 1934, showed an increase of 27.8% and shipments an increase of 51.0% as compared with January, 1933. Portland cement stocks at mills were 5.3% lower than a year ago. The factory value of the shipments from the mills in 1933—64,086,000 bbl. —is estimated as $83,965,000.

The statistics here given are compiled from reports for January, received by the Bureau of Mines, from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 163 plants at the close of January, 1934, and of 165 plants at the close of January, 1933.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

	January 1933	1934	Dec., 1933	Nov., 1933	Oct., 1933
The month.....	12.9	16.6	15.5	21.2	22.1
The 12 months ended	27.6	23.9	23.6	23.9	24.5

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M. B. Jones, manager of the Santa Cruz Portland Cement Co., of California at his office in Portland, Ore., confirmed on February 14, news that this company will erect a $300,000 cement plant in Portland on property purchased from the Fisher Flouring Mills Co., Seattle, Wash. Construction of the plant, which will have a storage capacity of 60,000 bbl., will begin shortly.

Construction News

Volume of building construction in the United States for January, 1934, amounted to $226,139,536. According to the Indiana Limestone Corp. survey, this compares with $90,858,040 for January, 1933, and with the total of $507,954,000 for January, 1926—the year which the government uses as its "normal" index. While admitting that there is as yet a definite dependence on the stimulus of Federal aid in the construction industry, A. E. Dickinson, president of the Indiana concern, called attention to signs of renewed activity in home building especially in the southwest where the residential shortage, in his opinion, has assumed "important proportions."

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An additional $400,000,000 appropriation for federal highway projects for the fiscal year 1935 is asked in the resolution forwarded to the government by the American Road Builders' Association which recently convened in Chicago. The association also recommends the use of gasoline and other motor vehicle revenue for highways only, and liberalization of terms for loans and grants to cities and counties on non-Federal public works projects under PWA.

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Highway work on federal and state projects in the 1933-1934 winter season reached an all-time high for cold weather operation according to figures supplied by the Bureau of Public Roads, U. S. Department of Agriculture, which is administering the $400,000,000 appropriation for public works highways. Over 70 per cent of the appropriation now is involved on highway work already advertised for contract or under construction, according to the bureau, and a total of 956,000 men were employed at the time the latest data was compiled at the first of the year. Most of the men employed, 543,000, are listed as having been employed on industrial labor in dependent industries such as stone quarries, gravel pits, etc.; 362,000 of the workers have been employed at the site of the highways and the additional 51,000 workers represent administrative and supervisory labor.

Miscellaneous

Solvang Development Co., Solvang, Calif., has been organized for the purpose of developing the diatomaceous (celite) earth deposits near that city. H. C. Johnson, president of the concern, announces that the main objective is meeting the demand for high grade filtration, insulation and fireproofing material. The company claims that the present method of grinding diatomaceous earth "destroys practically 90 per cent of the high grade material used in filtration." By the method which will be used it is said that less than 12 per cent of the high quality of the product will be lost. Paul Lassen, Los Angeles, is vice-president and Jay Dutter secretary-treasurer; Elliott S. Hastings, mining engineer who made the original survey of the property, is reported to have joined the organization.

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Edmund Burk, chemist of the Montana Agricultural Experiment Station, referring to the use of "treble superphosphate" for deficient soils and feed, stated in a recent issue of the Billings (Mont.) *Times:* "Reports have come to us that some people claim that this product is just a by-product obtained by grinding up tailings and slag from the smelter, putting this in bags and placing it on the market, thus making an undue profit. The fact is that sulphur coming from the Butte ores is the only element that can in any way be termed a byproduct. This element, at that, has to be purified and converted by a complicated process into sulphuric acid before it can be used in the manufacture of treble superphosphate, a fertilizer, or dicalcium phosphate, a stock food. A new product, Anaconda monocalcium phosphate, suitable for feeding to livestock suffering from lack of lime and phosphates, is made in much the same way, except that the phosphoric acid is specially treated for removal of fluorine which is injurious to animals, and this pure phosphoric acid is mixed with a high grade burned lime to make a neutral product."

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Hugh G. Williams, mayor of Granville, N. Y., and one of the slate operators active in forming a code for the slate industry, recently reported an order for 400 square yards of slate and expressed the belief that by spring there will be a "decided upswing" in the slate business: "Setting of standard prices will bring great benefits. Under the code jobbers' and roofers' discounts will be provided for. All prices will be uniform, leaving no room for haggling and quibbling. Slate in the last few years has been sold at less than cost due to the piling up of surplus stock. Now that situation is part of the past. Wages have been altered to conform with the code."

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Sand-Lime Brick Production and Shipments in January, 1934

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Ten sand-lime brick plants reported for the month of January, this number being the same as the number reporting for the month of December, 1933, statistics for which were published January 25:

Average Prices for January

Shipping point	Plant price	Delivered
Mishawaka, Ind.	$ 8.50	$.....
Detroit, Mich.	9.50	11.50
Detroit, Mich.	.....	11.50
Grand Rapids, Mich.	.....	12.00
Saginaw, Mich.	10.00	.....
Syracuse, N. Y.	16.00	20.00
Madison, Wis.	11.00	12.50
Toronto, Ont., Can.	12.00	13.50

Statistics for December and January

	†December	*January
Production	600,745	966,610
Shipments (rail)	.....	16,000
Shipments (truck) ...	800,190	790,735
Stocks on hand	2,010,278	2,213,223
Unfilled orders	75,000	100,000

†Ten plants reporting; incomplete, three not reporting unfilled orders.

*Ten plants reporting; incomplete, four not reporting unfilled orders.

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Fire of incendiary origin damaged the factory of Sioux Falls Pressed Brick Co., Sioux Falls, S. D. Plans are underway for rebuilding. They report six good jobs sold if the government aid goes through as planned, using over 1,000,000 brick.

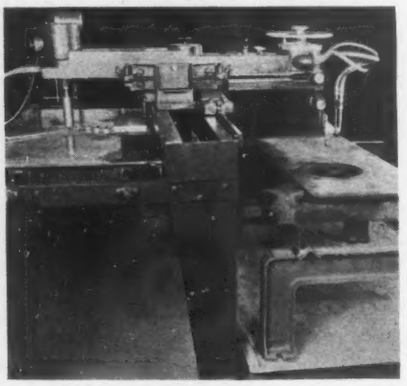
Plans to start up in April are announced by the Wisconsin Brick Co., Madison, Wis.

New Machinery and Equipment

For Special Cutting

AS AN ADDITION to its line of welding and cutting apparatus, the Linde Air Products Co. has introduced a new stationary cutting machine which it calls the "Pantosec." It is suitable for cutting dies, cams and other units that must be smoothly and accurately machined.

It has a cutting range of 44-in. longitudinally and 20-in. laterally and can perform

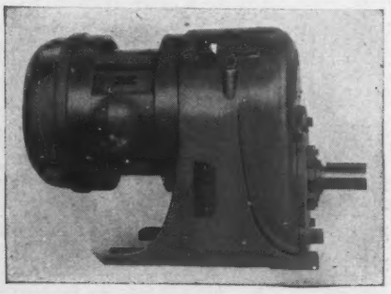


Stationary cutter

straight line cutting, angle cutting, beveling, etc. Floor space required is 72 by 83 in. The machine consists of a carriage mounted on three-point supports. Piping for gases is all enclosed in the carriage and all drives are protected by special casings. The motor may be specified to run on either 110- or 220-volt current. All wiring is concealed and switches and controls are easily accessible to the operator.

Gearmotors

TO be used in ratios up to 6:1 inclusive, the Reliance Electric and Engineering Co. has added single reduction units to its line of gearmotors. They are furnished with both D. C. and A. C. motors of various types in sizes rated from ¾ hp. to standard large sizes. Multi-speed and adjustable-speed motors may be used. The entire reduction is obtained in a single pair of gears. Substantial feet, cast integral with the gear housing itself, affords solid support "close to the point of maximum torque application," according to the designers. Ball-bearings are used throughout.

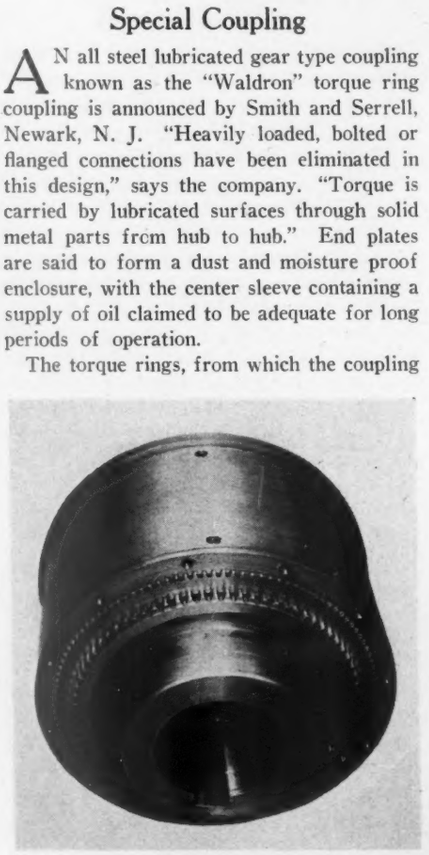


Single reduction gearmotor

Special Coupling

AN all steel lubricated gear type coupling known as the "Waldron" torque ring coupling is announced by Smith and Serrell, Newark, N. J. "Heavily loaded, bolted or flanged connections have been eliminated in this design," says the company. "Torque is carried by lubricated surfaces through solid metal parts from hub to hub." End plates are said to form a dust and moisture proof enclosure, with the center sleeve containing a supply of oil claimed to be adequate for long periods of operation.

The torque rings, from which the coupling

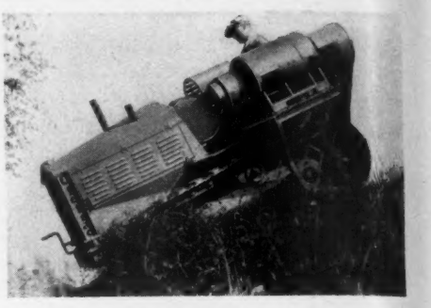


All-steel lubricated coupling

derives its name, are two solid steel rings with teeth cut, as shown in the illustration, on inside and outside. Thus is provided what is termed quadruple engagement or four points at which relative movements between the cooperating teeth can freely take place, according to the manufacturer, and thereby provide for misalignment or endwise displacement of the connected shaft.

Mounts Arc Welding Unit on Tractor

ANNOUNCEMENT of a new mounting for its arc welding equipment is made by the Universal Power Co., Cleveland, Ohio.. The combined unit was developed through cooperation of this company with the Cleveland Tractor Co.

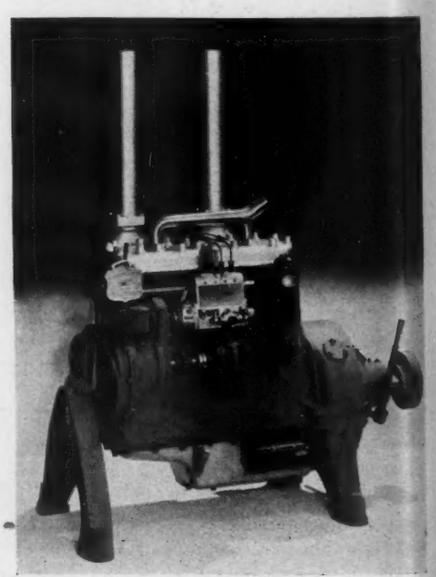


Welder on crawler

This new mounting is on the Cletrac crawler tractor, the welder being driven by the engine of the tractor. It does not eliminate the use of the tractor for regular service, and the welding unit may be demounted by the removal of a few bolts. The unit is especially useful for welding at operations where electric current is not conveniently available.

Diesel Design

A DIESEL engine, simple in design and operation has recently been developed. It is of unusual construction, using only one valve per cylinder, thus permitting the use of conventional L-head design. This new 4-cylinder diesel operates at a rated speed of 1200 r.p.m. and develops 75 hp. at this speed. The fuel consumption at 75 hp. is .44 lb. per hp. hour. Since the torque curve on this engine is so flat and the fuel consumption so complete, it is practicable to run this engine over a speed range from 200 to



Four-cylinder Diesel

2000 r.p.m. and still get a clear exhaust and a fuel consumption of less than .5 lbs. per hp. hour, it is claimed.

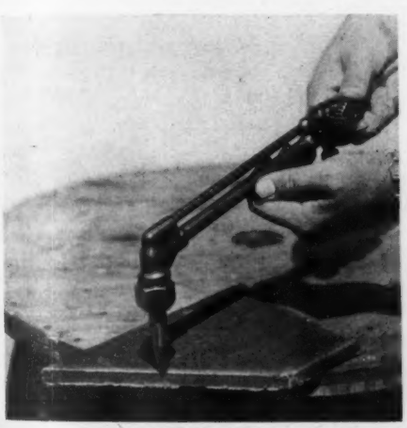
There is in the 4-cylinder motor, shown here, available horsepower ranging from 35 hp. to 125 hp.

In a recent interview the designer of this engine, said: "Standardization was one of our major considerations when first developing this engine. It will be available in from one to eight cylinders, but throughout the entire line, the same size of pistons, rings, rods, valves, etc., will be used. This will materially simplify service and parts replacement. The engines are now being built for automotive installations, for marine uses, and for stationary and agricultural power purposes"

Cutting Attachment for Welding Torch

THE Smith Welding Equipment Corp., Minneapolis, Minn., announces a new cutting assembly, or attachment, for a welding torch called the "Money-Saver." Customary features such as levers for the cutting oxygen, adjustable unions to change the position of the assembly in the handle, etc., have been replaced by valves.

The cutting oxygen valve is a triple



Cutting assembly

thread, screw valve with knurled thumb wheel as shown, so arranged that it can be opened and closed with the thumb. The valve forging has been reduced to the simplest possible design, and the cutting tip automatically evens up the flames, the manufacturer states. The new assembly has received approval from the Underwriters' Laboratories.

Boiler Drum Water Level Recorders

THE Bailey Meter Co., Cleveland, Ohio, has developed a complete line of boiler drum water level recorders and indicators to give operators a complete picture of the rate of change of water level and show the true level throughout the full range of the drum.

The Bailey boiler water level recorder

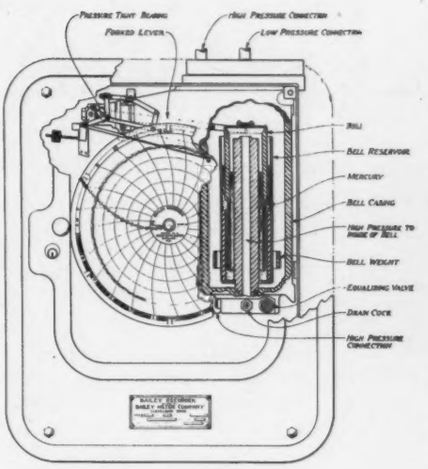


Diagram of recorder

operates on the difference in level obtained by making two connections to the water column or boiler drum; one connection being made to the water space, and the other to the steam space where a constant water head is maintained in the connection by means of a steam condensing radiator and a reservoir. The variable head or water space connection is applied over a mercury sealed bell and the constant head connection is applied to the inside of this bell. As the boiler water level rises or falls, the mercury sealed bell falls or rises and this motion is transmitted to the recording pen by a forked lever and a spindle which turns in pressure bearings.

The water level recorder may be incorporated with a feed water flow meter to record the two related factors on one chart.

Large Capacity Crawler Wagon

THE Trackson Co., Milwaukee, Wis., announces the "Levee Special," a larger capacity crawler wagon especially constructed for dragline loading. This new Trackson product has a water measure capacity of 9 cu. yd., or 11 cu. yd. heaped.

A feature claimed for this "Levee Special" is that the crawler wheels are constructed to equal the rolling efficiency of a pair of huge wheels approximately 48 ft. in diameter. The arch in Trackson crawler wheels which makes this possible is renew-

Crawler unit

able. Crawler wheels that have been in service for over 5000 hours have been completely re-arched, it is claimed, and are in as serviceable and easy running condition as when new.

Public Works Equipment

MANY municipalities and other local government units recently have purchased equipment of various kinds for execution of local road work and related relief projects. "For all manner of odd jobs in Schoharie county, New York, our modern truck mounted shovel is doing a good job," states L. J. Wright, highway superintendent. With a shovel capacity of ½ cu. yd. its uses include cleaning of creek beds, handling sand and stone from stock pile and bank, grading, general excavating, removing mountain slides, etc.

Depending on the type of work for which it is employed from time to time the unit can be equipped with shovel, dragline or hoe to handle most any kind of job. The shovel itself is a P and H Model 202-B. In addition to the line of work it handles for the county, it also has seen service in the hands of state highway department engineers for general widening of curves and other odd jobs.

Mounted shovel unit for county program

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.
Consulting Specialist, Pittsburgh, Pa.

The Hydration of the Silicates in Portland Cement. K. Koyanago of Tokio has shaken coarse grains of high early strength cement with absolute alcohol for 24 hours. After drying it was mixed with 20 parts of distilled water or lime water and shaken again at room temperature. After a few hours the liquid phase became cloudy and later fairly large white crystals of $Ca(OH)_2$ developed which were identified by means of chemical and petrographic analysis. In addition, a fine gel-like substance separated out on long standing. On analysis, after correcting for known compounds, the ratio of $CaO \cdot SiO_2$ was found to be approaching unity and a compound $CaO \cdot SiO_2 \cdot 2H_2$ was obtained, apparently similar to the mineral, plombierite. The aluminate is apparently present as $3CaO \cdot Al_2O_3 \cdot 10.5H_2O$. *Zement* (1932) 22, No. 51, p. 705.

Calcium Aluminates and Their Significance in Cements. An important contribution to the study of the setting of cements has been made by Gunnar Assarsson, who gives the results of phase relations in the system, $CaO \cdot Al_2O_3 \cdot H_2O$, and applies these to the setting reactions of aluminous and portland cements. The diagram for the solubilities is given in the Fig. 1. In region *A* the tetracalcium salt crystallizes out as $4CaO \cdot Al_2O_3 \cdot 10.5\,H_2O$. In *B* the tri-salt separates in hexagonal crystals as $3CaO \cdot Al_2O_3 \cdot 12H_2O$ mixed with $2CaO \cdot Al_2O_3 \cdot 9H_2O$, which tends to separate out toward the end. From the region *C* mixtures of tetra- and tri-salts crystallize, while *E* and *F* are areas of supersaturation from which mixtures of salt crystals and alumina gel precipitate. In area *G* lie solutions from which aluminum hydroxide crystallizes, chiefly as $Al_2O_3 \cdot 4H_2O$, mixed with the three calcium salts. In area *H* the solutions seem to be metastabile, no precipitates forming. If the lime is removed from these solutions, say by precipitation as carbonate, the hydroxide of aluminum separates directly. At higher temperatures the crystallizations are more rapid, producing more clearly defined products.

When monocalcium aluminate is shaken with sufficient water, the voluntary separation produces products which can usually be identified readily; but when small amounts of water are added, they are used up and the crystallization processes can be greatly slowed up or even stopped. Under such conditions products are to be expected which are quite different, being chiefly, or completely gels. In the liquid phase, at first only slightly more CaO is found than Al_2O_3 (1.15:1), the concentration reaching a maximum in about half an hour, after which rapid precipitation occurs so that by the fifth hour, at ordinary temperatures, a ratio of about 3:1 is reached. Starting with the second hour, the reaction products begin to appear, a gel-like substance of index 1.53 forming around the corners of the grains and developing gradually toward their centers. This gel is the chief product of the hydration of monocalcium aluminate, but hexagonal plates of the dicalcium aluminate mixed with small amounts of tri- and tetra-salts also are formed. At the same time, in the liquid phase a readily peptizable gel having a monomolecular ratio is formed. Its index lies between 1.48 and 1.50 and contains no free lime, when tested with White's reagent.

Tricalcium pentaluminate behaves in the same way as the anhydrous monocalcium compound, except for the formation of a little gel of higher refractive index. Tricalcium aluminate gives solutions of concentrations along the tri-aluminate line; but even in regions *B* and *C* rapid crystallization occurs, so that no higher concentrations greater than point e are obtained. Gels are also formed. With Gehlenite, no evidence of hydration could be found experimentally.

On shaking two aluminous cements of different iron content (4 and 11%) with water varying from 0.4 to 20 parts, during the first hour solution only was observed with rapid precipitation after the second hour. With smaller amounts of water, the aluminate content in the liquid phase rose again, but not when larger amounts of water were present. The lime content approached in all cases a lower limit. The ratio of CaO to Al_2O_3 depended upon the amount of mixing water, being highest in dilute solutions, while in concentrated solutions the alumina predominated. The solid reaction product was a mixture of gel of index 1.53 and of di-aluminate. In the presence of much water and with prolonged shaking a gel of much lower, but of variable, index was produced. The latter was separated with centrifugal force, dried and analyzed, giving a compound close to $CaO \cdot Al_2O_3 \cdot 10H_2O$, although the exact water content is, of course, uncertain. Its solubility is much less than that of di-aluminate.

Other reaction products were also observed: needles containing alumina, some with and some without sulfates and a few hexagonal crystals of tri- or tetra-aluminates.

The reason for the increase in aluminate in the liquid phase in the mixtures containing less water is probably because of the increase in alkalies in solution, which would hold alumina in solution and thereby reduce the amount of lime remaining unprecipitated. This effect was found to depend upon the amount of alkali in solution.

Based on these experimental observations, the following mechanism is suggested for aluminous cements: During the first two hours solution of monocalcium aluminate occurs, followed by the precipitation of a gel of index 1.53, which seems to be monocalcium aluminate, chiefly, the main product of the hydration. In addition, other aluminates, chiefly dicalcium aluminates, may be formed and corresponding thereto aluminum hydroxide must also be formed. The other compounds found in aluminous cements, dicalcium silicate and the ferrite compounds, etc., also probably form gels.

On mixing portland cement containing gypsum with water ranging from 0.4 to 1.0 parts and analyzing the liquid phase the results shown in Fig. 2 were obtained. The alkalies are soon completely hydrolyzed. The concentration of the gypsum, of course, varies with the amount of solvent, but in a direction opposite to the excess of lime in solution. This lime reaches a maximum, followed by a minimum, as it is being precipitated with crystal formation as the gypsum goes into solution. After the latter is taken out by the aluminate, the lime concentration has a chance to rise to a second maximum, followed by a slow dropping off, perhaps through carbonation. *Zement* (1934) 23, No. 1, p. 1; No. 2, p. 15.

Publications Received

Iron Oxide Mineral Pigments of the United States—Bulletin 370, U. S. Bureau of Mines, by Hewitt Wilson: This is a report of the first national investigation of mineral pigments. It reviews the occurrence of pigments and allied iron ores, and the nomenclature and common methods of classifying and testing many commercial mineral pigments used in this country. Tests for color, tinting strength, fineness of grain, oil absorption, and content of iron oxide were made on 274 samples. Most of these had no commercial value because of poor color, poor tinting strength, and low content of iron oxide. Possibilities in many, however, are shown. The report is very comprehensive and should be in the library of all interested rock products producers.

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Limestone (United States Bureau of Mines, Information Circular 6723). Oliver Bowles and D. M. Banks give 21 pp. of general information on use of limestone in both dimension and crushed stone industries. Summaries of specification requirements are helpful.

THE INDUSTRY

New Incorporations

Superior Lime Co., 354 Scholes St., Brooklyn, N. Y. Sylvan Solomon.

Ozark Minerals Co., Cairo, Ill. 250 shares p. v. com. Incorporators are J. E. Clutts, J. W. Peterson and A. M. Davis.

Auglaize Sand and Gravel Co., Lima, Ohio, incorporating with $25,000 and 500 shares no par. Incorporators are: Chester A. Churchill, Elmer E. Welty and Ruth Endly.

Hilton Stone Quarry Corp., incorporating with an authorized capital stock, 10 shares, no par value. C. Elmer Ehrhardt, Samuel May and Howard Calvert Breyd are the incorporators.

Western Portland Cement Co. (Utah). Capital stock, 2,000 shares without par value —$10.00 paid for each share. To manufacture and deal in cement and other construction materials. Office, Ogden, Utah.

Lagerhausen Lumber and Coal Co., Desplaines, Ill. Incorporators are: George, Walter and Barney Lagerhausen. 400 shares p. v. com. To deal generally in wood, lumber, cement, lime and other building materials and supplies.

National Vermiculite Products Corp., Chicago, Ill. Proposes to issue 11,230 shares of common stock of which 10,005 shares will be sold for cash to stockholders other than the issuer. A. T. Kearney is president, John Mohr, treasurer, and D. D. Sells, secretary. Engaging in mining, treating, reducing and expanding vermiculite and other ores and marketing such ores and products developed therefrom.

Personals

Sewell Avery, president of U. S. Gypsum Co. and Montgomery Ward & Co., Chicago, Ill., has been elected to the board of Nash Motors Co.

M. Moss Alexander was elected president of the Missouri Portland Cement Co. to succeed the late Harry L. Block. Mr. Alexander was formerly with the Oklahoma Portland Cement Co.

Fred Wiggins of Birmingham, Ala., has been appointed district manager of the Atlas Portland Cement Co. His territory includes eight southern states.

Wilbur Newton, Denver, Colo., member of the investment banking house of Boettcher & Co., has been elected a director of Ideal Cement Co. to succeed J. Q. Newton.

J. L. Torphy has been appointed manager of the Empire Stone Co., Bloomfield, Ind., to succeed Irvin Matthews, who recently resigned. Formerly Mr. Torphy was president of the Shawnee Stone Co.

Dr. A. R. McMillen has been reelected president of Sarnia Cement Products Co., Sarnia, Ont., Can. Other officers elected February 5 were: Frank James, vice president; Harold Fuller, secretary, and Walter D. Reid, general manager and treasurer.

James G. Vail, vice president and chemical director of Philadelphia Quartz Co., recently lectured at Roanoke, Va., before the Virginia Blue Ridge section of the American Chemical Society on the subject, "The Properties of Silica in Solution and Soluble Silicate Applied to Industry."

Edward C. Mattis was elected president of the Laura Gravel & Stone Co., Arcanum, Ohio, at its 15th annual stockholders' meeting January 29. Other officers named were: Robert Kraus, vice president, I. E. Baker, secretary-treasurer and general manager, and Roger Baker, sales manager.

E. E. Evans, secretary-treasurer, Volunteer Portland Cement Corp., Knoxville, Tenn., has been chosen as a member of the local Chamber of Commerce Manufacturers' Committee, which will take part in organization of the recently proposed Wholesalers' and Manufacturers' Bureau of the Chamber.

F. J. Twaits, Los Angeles, Calif., president of Consolidated Rock Products Co., has resigned as president and as chairman of the board of directors. Frank Gautier, previously president and general manager of Consumers' Rock and Gravel Co., a predecessor company, has been appointed executive vice president and manager.

Obituaries

President C. A. Campbell of the Campbell Stone, Indian River, Mich., died recently. Mr. Campbell's company operates crushed stone and lime plants at Afton, Mich.

W. M. Beyer, 65, president of Beyer Crushed Rock Co., Kansas City, Mo., died January 26, apparently a suicide. His will, filed early in February, disposes of an estate estimated at over $20,000.

Frank W. Kennedy, 58, vice president and general manager of the De Laval Steam Turbine Co., Trenton, N. J., died at his home at Yardley, Penn., January 24, 1934, after a short illness. He was vice president of the Wilbur Trust Co., and a director of the First Mechanics National Bank, Trenton.

Harry L. Block, 70, president of Missouri Portland Cement Co., died of heart disease at his home in Clayton, Mo., St. Louis suburb, February 6. Born in Pike County, Mo., Mr. Block received all his education within the state and began his business career as an employe of the Municipal Electric Light Co. at St. Louis. In 1892 he organized the Union Sand and Material Co. Through a series of mergers this developed into the Missouri Portland Cement Co. with a capital which now exceeds $7,000,000 and which controls cement plants in St. Louis, Kansas City, and other plants in Memphis and St. Louis. He was prominent as a witness in the government anti-trust inquiries following the world war. In this connection the company in 1924 agreed to pay the state a fine amounting to $27,500. Surviving the deceased are his widow, two daughters, and a brother, George M. Block, vice president and general counsel of the company.

Frank A. Furst, 88, president of the Arundel Sand and Gravel Corp. and of Arundel Corp., Baltimore, Md., died January 23. His will, filed January 27, bequeathed about $1,000,000, approximately half of which was distributed among Catholic, Jewish and Protestant charities. Mr. Furst was a native of Germany and was brought to this country at the age of three. After being connected with the Pennsylvania Railroad, he formed in 1899 the Maryland Dredging and Contracting Co. By 1919 he had consolidated several of the companies in which he was interested into the Arundel Corp. Among the large projects handled by this concern were excavations for the Cape Cod Canal, the Everglade drainage project and sub-aqueous rock excavation around New York harbor. The latter proposition involved 12 contracts and the removal of more than 1,000,000 cu. yd. of rock. The Everglade project required the removal of 35,000,000 cu. yd. of material. At many points from Portland, Me., to Key West, Fla., the company has worked its equipment.

Cement

Olympic Portland Cement Co., Bellingham, Wash., opened the raw mill unit and put one of its kilns into operation in February.

Lehigh Portland Cement Co. plant, Cleveland, Ohio, set its plant in working order during February for reopening March 1.

Universal Atlas Cement Co. has been granted permission to construct loading docks in the Mississippi River at Ilasco, Mo.

Manitowoc Portland Cement Co., Manitowoc, Wis., recalled more than 100 employes in February to open its plant after a 90-day shut-down.

Bessemer Limestone and Cement Co., Youngstown, Ohio, had the Dollar Savings and Trust Co. appointed as trustee to succeed the Guardian Trust Co. of Cleveland.

Arkansas Portland Cement Co. recalled 85 men to work February 9 and is now operating at its capacity of 2,700 bbl. a day. New storage buildings are being erected at a cost of $10,000 and the monthly payroll under the new schedule is reported to average $10,000.

Universal Atlas Cement Co. plant, Universal, Penn., reports its workers completed January 31 a 1,000-day record without a lost time accident. This is the third of the company's plants to become eligible for membership in the 1,000 day club of the Portland Cement Association.

Huron Portland Cement Co. plans an additional plant property on the west side of the Oswego river, Albany, N. Y., to cost $100,000. The company and the Delaware, Lackawanna and Western Railroad have received permission to construct and operate switches and side tracks servicing this plant.

Olympic Portland Cement Co. plant, Bellingham, Wash., recently announced that operations would begin February 20 with at least one kiln being operated. The schedule calls for the employment of about 40 men. The quarry at Kendall, Wash., will be reopened later when the present stock of limestone runs low.

Universal Atlas Cement Co. plant, Hudson, N. Y., resumed operations February 1 after having been closed since November. Between 450 and 500 men are called for on the new production schedule. Richard A. Dittmar, plant superintendent, recalled the entire crew of men laid off last fall and has put two kilns in operation.

Calaveras Cement Co. plant near San Andreas, Calif., reports that its last lost-time accident occurred June 30, 1930. D. H. Wheeler, plant engineer, stated that this mark of 1,316 days with a no-accident record gives this plant the best record of any cement factory in California and a ranking of tenth in the entire country. Yosemite Portland Cement Co. plant, Merced, Calif., announced completion, early in February, of an 18-month no-accident record.

Santa Cruz Portland Cement Co. plant, Davenport, Calif., began February 2 to pump cement into the new loading silos at a rate which Joseph Riordan, plant superintendent, says would require five days for filling each of the four large and three small silos. At a cost of $10,000, an automatic pump scale has been installed for weighing outbound car shipments. Shipments will be relayed from silos during March. Twenty-two carloads of cement left this plant February 1 for the Canal Zone, San Francisco, Oakland and Calistoga. Pending completion of the new wharf which will be 2,500 ft. long, cement loadings will be made at the plant. Pipe lines are being laid from the silos to loading bins or bulk cars as a temporary arrangement.

Dewey Portland Cement Co., Dewey, Okla., recently completed construction of a new clinker storage shed, 80 by 300 ft., housing an overhead traveling electric crane and other equipment for use during February operations which were scheduled for 60 percent of capacity. About 150 men have been employed on the necessary preliminary construction work and a general overhauling of machinery. About 215 men have been employed for operations beginning February 5. Should demand for cement increase because of the spring weather, the plant will be operated at full capacity, giving employment to 300 or more men. Officials of the company point out that CWA activities during the mild winter have been responsible for considerable building and the increased demand for cement.

Quarries

CWA workers are quarrying rock near Humboldt, Ia.

City of Princeton, Mo., has purchased rock crushing equipment.

A quarry has been opened near Moundsville, W. Va., by CWA workers.

L. W. Hayes quarry, Bethany, Mo., has been manned by 50 CWA workers.

Albany Limestone Co., Albany, N. Y., has filed notice of preliminary dissolution.

Black Water Stone Co., near Gallatin, Mo., has reopened with new machinery installed.

Winterset Limestone Co., Winterset, Ia., has put 30 men to work in its quarry near here.

W. S. Cox and Son quarry, Fayette, Mo., is furnishing crushed stone for local road projects.

Inland Lime and Stone Co., Manistique, Mich., has resumed full time operation with 130 men.

CWA district officials recently inspected the relief work quarries being operated near Slater, Mo.

Pearl Quarries, near Napa, Calif., reports a growing demand for its product, especially pumice sand.

Lee County, Ia., is operating three rock quarries in connection with the local CWA relief program.

Two rock crushers are being employed by Washington county, Ia., in connection with a CWA project.

Seven hundred tons of rock recently have been removed from the CWA worked quarry at Mandeville, Mo.

Wyoming Limestone Co. has resumed operation in its Sheep Canyon quarry ten miles north of Greybull.

Atlas Rock Co., Oakdale, Calif., has resumed operation with a primary order for 6,000 tons of crushed rock.

L. W. Jenkins, relief-director of Allen County, Ohio, anticipates the opening of a stone quarry at Hendrysburg.

A construction company, placing recent substantial orders for rock, is responsible for opening of Lautenschlager quarry near Whiterock, Mo.

Commissioners Thompson, Chowning and Dunaway of the Madison Special Road District, Madison, Mo., have purchased a rock crusher and tractor.

County authorities in Washington, Ia., have purchased air compressor drill equipment for blasting operations in two county quarries near Washington, Ia.

Ellis Park Co., operating four portable plants, has employed 150 CWA workers on property near Cedar Rapids, Iowa. Lee Crawford is superintendent.

Decatur County, Ia., has purchased rock crushing equipment which is being operated in connection with the manual work of 60 CWA payrollers near Davis City.

Caldwell Stone Co., Danville, Ky., reports a contract to crush 15,000 tons of rock for road building in Clinton County. The concern is operating under a 10-year lease.

Rock from the Fitzgerald quarry near Beattie, Kan., worked by CWA men, is being crushed at the rate of about 30 cu. yd. per hour for local highway surfacing projects.

Nine quarry projects are being worked near Winterset, Ia. Two of them are privately operated and most of the rest are being worked in connection with CWA projects.

Rock crushing equipment purchased by Tama County, Ia., was secured on terms requiring $720 cash, which was furnished by the town of Dysart. The county is crediting Dysart in crushed rock supplied for its streets.

CWA workers recently discovered stone quarry property at Gould Park, near Santa Barbara, Calif., which City Engineer E. B. Brown says is one of the richest deposits in that section. It will be worked for breakwater development.

National Mortar and Supply Co. quarry at Gibsonburg, Ohio, ranked first among 58 plants recently competing in a campaign against accidents. Second and third place went to the France Stone Co. quarries at Kenton and Bloomville.

Marblehead Lime Co. plant at Hannibal, Mo., went on a 24-hour daily operating schedule February 5, employing approximately 180 men. The company has contracts for stone to be used in construction of Locks No. 21 and No. 22, south of Hannibal on the Mississippi River.

Tobin Quarry Co. operating out of St. Genevieve, Mo., has opened a new rock quarry employing 25 men between Ft. Gage and Riley Lake. This quarry will furnish rock for the river improvement project undertaken near the lake by the Morrison Construction Co., under contract with the PWA.

Sand and Gravel

King City, Mo., recently considered offers of rock crushing equipment.

Gravel pits have been located near South Bryant near De Smet, S. D.

Gravel pits east of Burlington Junction, Mo., are being worked by 26 CWA men.

A new gravel pit has been opened near Parker, S. D., to supply material for a CWA project.

Laura Gravel and Stone Co., Arcanum, Ohio, is considering the building of a washing plant.

Heagy gravel property near Boonville, Ind., has been reopened for the first time in 20 years.

Nelson gravel pit property near Barnard, Mo., is the source of CWA-worked material contracted for by the city.

Brown county pits are the source of material for the re-graveling of about 135 miles of county road in Kansas.

Lutesville Sand and Gravel Co. has resumed operations at Colfax, La., and anticipates steady operation for six months or possibly a year.

Industrial Mineral Sales Co., Pittsburgh, Calif., has been purchased by R. M. Greathouse. V. C. Hollingsworth was former owner of this silica sand producing concern.

Kinsman Sand and Gravel Co., Kinsman, Ohio, has installed a new crushing unit, bulk conveyor and screen. CWA demand, says the company, for sand and gravel has greatly stimulated sales.

Estill Springs Sand and Gravel Co., Estill Springs, Tenn., reports construction of a new bridge across Elk River to make material deposits more accessible to the plant which is now running at full capacity. It is operating under NRA regulations, says the company, and has added the required number of workers.

Florida Gravel Co. launched a new barge at River Junction, Fla., recently. The new barge has a deck 75 by 22 ft. and measures 55 by 22 at the water line. It has a capacity of around 200 tons. The company's new dredge unit has been completed to supplement the operation of its other unit now enroute to Columbus, Ga., on a project for the Georgia Gravel Co. W. B. Richards, general superintendent of the concern designed the new dredge. It is powered by a Bessemer Diesel, carries a large centrifugal pump, vibrating grader and loading equipment.

Trade Literature

Resurfacing. Twenty-four page booklet on repair of industrial floors and walls. STONHARD CO., Philadelphia, Penn.

Lubrication. Bulletin R-102 on the lubrication of small mechanical devices. ACHESON OILDAG CO., Port Huron, Mich.

Tires. Forty-page booklet on truck and bus tires as "Operators Hand Book." B. F. GOODRICH RUBBER CO., Akron, Ohio.

Mixers. Four page illustrated bulletin on new lightweight concrete mixers. NATIONAL EQUIPMENT CORP., Milwaukee, Wis.

Tractors. Four page rotogravure supplement, newspaper style, illustrates various applications of tractor equipment. CLEVELAND TRACTOR CO., Cleveland, Ohio.

Soap. Pumice soap presented in poster form for free distribution as a safety aid for employes. PROCTER AND GAMBLE CO., Cincinnati, Ohio.

Motors. January-February issue of *Messenger* devoted to new developments in motor equipment and maintenance. LOUIS ALLIS CO., Milwaukee, Wis.

Manufacturers

Armstrong Bros. Tool Co., Chicago, Ill., has added "Star" drills to its line.

Ingersoll-Rand Co., Phillipsburg, N. J., has acquired the turbo-blower business of General Electric Co.

C. R. Messinger

Chain Belt Co., Milwaukee, Wis., announces that C. R. Messinger, chairman of the board, has resumed his post of president, vacated by the recent death of his brother, Clifford F. Messinger. C. R. Messinger has been president of the Oliver Farm Equipment Co. and recently was elected chairman of the Oliver board.

Patterson Foundry and Machine Co., East Liverpool, Ohio, has appointed C. V. Murray to its New York branch.

Harnischfeger Corp., Milwaukee, Wis., reports utilization of its P and H shovel equipment in Ural mountain territory of U. S. S. R.

General Electric Co., Schenectady, N. Y., announces a line of gas burning furnaces to supplement its oil furnace line placed on the market in 1933.

Worthington Pump and Machinery Corp., Harrison, N. J., announces election of A. G. Pratt, president of the Babcock and Wilcox Co., to the board of directors.

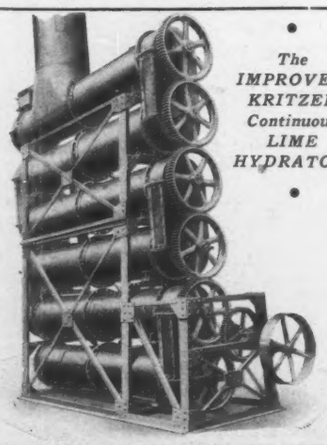
Roots-Connersville Blower Corp. is the new name of the concern formerly called the Connersville Blower Co., Inc. Change was made officially at the recent annual meeting.

Joseph T. Ryerson and Sons, Inc., Chicago, Ill., announces that H. B. Ressler, vice president in charge of sales, has been assigned to the Jersey City plant, where he also will have contact with other eastern divisions of the company.

Hercules Powder Co,. Inc., Wilmington. Del., held a special conference of field and service men in New York during February. The educational "short course" included inspection of the smokeless powder plant at Kenvil, N. J.

Bucyrus-Erie Co., South Milwaukee, Wis., announces its "Rock Grab" is available in four, rather than three, sizes, as originally announced. (See ROCK PRODUCTS, February, 1934, page 63.) The size not before specified is the 2½ ton model.

E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., recently held its 17th annual convention of the technical section, explosives department. More than seventy attended, among whom were technical field men, explosive salesmen, explosive chemists, plant managers, executives of the explosives department, and staff of the home office of the technical section. Nearly 200 topics relating to explosives were discussed.



The IMPROVED KRITZER Continuous LIME HYDRATOR

HYDRATE

KRITZER HYDRATE-QUALITY—the words are synonymous. For over thirty years The Kritzer Company has been manufacturing, developing and installing hydrators, hydrating equipment and lime plants.

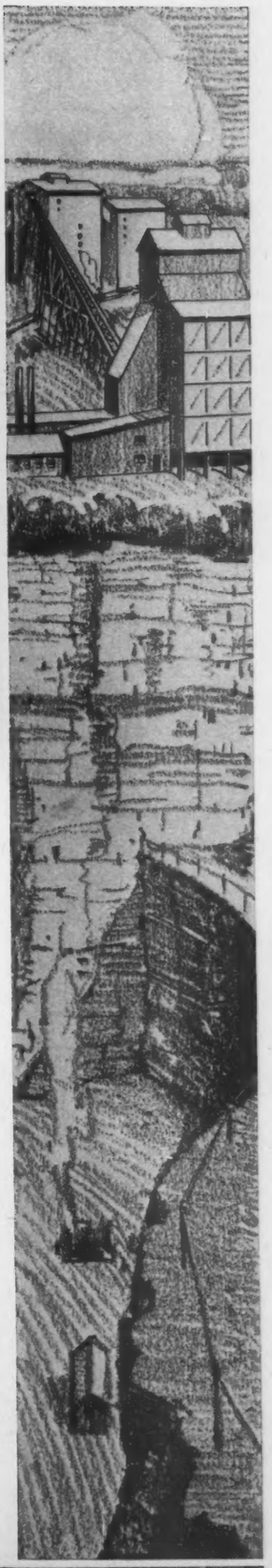
"HYDRATING LIME THE KRITZER WAY" is not a laboratory experiment but has been tried and proven in actual installations in practically every section of this country and foreign countries.

THE EXACTING SPECIFICATIONS of the present day HYDRATED LIME MARKET demand that particular attention be paid to equipment used in the manufacture of hydrate. When you equip THE KRITZER WAY you are assured a product that will meet the most exacting specifications.

THE KRITZER COMPANY

515 West 35th Street **CHICAGO, ILL.**

A Seven-Foot Cone Crusher Installation in a Limestone Plant



LEADING THE FIELD
In Fine Reduction Crushing

For producing in quantity such crushed materials as stone, gravel, slag and ores, the Symons Cone has demonstrated its superiority as compared with other types of crushing equipment. For capacity at lower crushing cost, it stands without an equal.

Whether the demand for materials requires a crusher of the large 7-foot size, or one as small as the 2-foot, and since they are now available in both the Standard and Short-Head Types, any fine crushing problem can be met with these machines. In these days, when it is more important than ever to modernize to meet the changing times, the advantages of the Symons Cone deserve the careful consideration of every producer of materials.

NORDBERG MFG. CO.

Milwaukee, Wisconsin

NEW YORK
60 E. 42nd Street

LONDON, ENG.
Bush House

LOS ANGELES
Subway Term. Bldg.

SYMONS CONE CRUSHER

NINE OUT OF TEN

. . . . . *never wear out!*

PERHAPS you haven't studied very closely the lives of 1000 conveyor belts. Would you be surprised to learn that 900 of them never wear out completely? That only one in ten is allowed to meet a *natural* death? Belts of equally high quality, serving in practically every branch of industry—and yet, the life of 90% is shortened unnecessarily! Why?

1—The wrong belt in the first place. Belts are like motors—they have to be engineered exactly to the intended use. Abstract quality is not enough—it is *fitness for the job* which counts, and that goes far deeper than specifications.

2—The other factor which shortens belt life is misuse after installing. In any plant, there are a hundred situations which can kill a belt, but it takes a study of a thousand belt histories to show what all of them are.

The Goodrich field organization is particularly qualified to help you stop both these life-taking factors. Goodrich field men work to prolong belt life . . . not when repairs are

Goodrich

CONVEYOR BELTS

necessary, but *when the belt is selected* and *after it is put in use.*

Whether or not you happen to be in the fortunate position of having your own belting expert, let a Goodrich representative examine your loading and unloading conditions, the features of your loading equipment, your arrangement of idlers, pulleys, trippers, take-up equipment, etc. This will enable him to interpret your particular problems intelligently.

It will give *you* the opportunity to learn the significance of Goodrich Belt Service and the true meaning of Goodrich Belt Value... The B. F. Goodrich Rubber Co., Mechanical Rubber Goods Division, Akron, Ohio.

GOODRICH MECHANICAL RUBBER GOODS FOR THE ROCK PRODUCTS INDUSTRY INCLUDE:

- *Conveyor, Elevator and Transmission Belting.*
- *Multiple V Belts.*
- *Air, Water, Steam and Suction Hose.*
- *Rubber Lining—for Storage, Pickling and Plating Tanks, Tank Cars, Pipe and Valves.*
- *Hard Rubber Goods.*
- *Molded Rubber Products.*
- *Packing . . . and*
- *A Complete Line of Miscellaneous Rubber Items.*

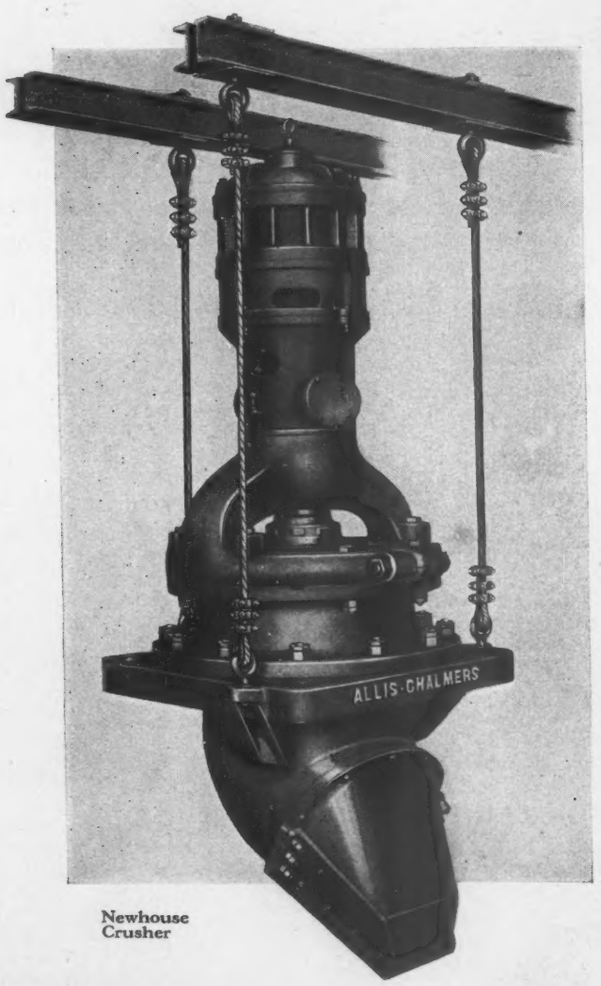
ALL *products problems* **IN RUBBER**

NRA MEMBER U.S. WE DO OUR PART

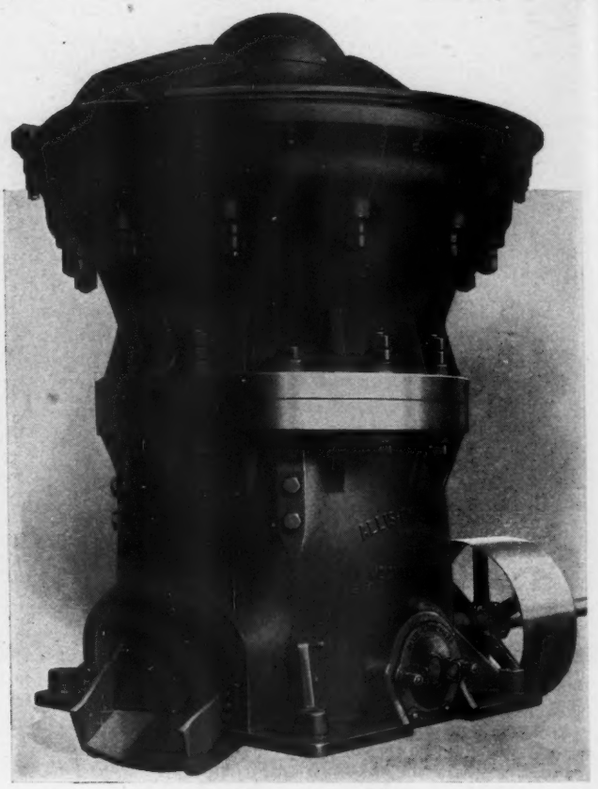
Conveyor Belting

The Type of Crusher
. . . . *to Suit Your Needs*

ALLIS-CHALMERS MANUFACTURING COMPANY has developed a line of crushing plant machinery which, with study and selection, will meet every possible combination of the varying factors of crushing plant operation in the most economical manner. As manufacturers of gyratory, jaw and roll type crushers, Allis-Chalmers is in a unique position; not being primarily interested in pushing the sale of any one of these types in preference to the others, our primary interest is always to help our customers solve their rock crushing problems in the most economical way.



Newhouse Crusher



36″ Superior McCully Crusher

TWO types of Allis-Chalmers crushers are illustrated here. The Superior McCully type (above) is the original short, heavy shaft gyratory greatly improved by constant development. The crusher is of rugged construction to withstand severe service. The lubricating system is simple and reliable and the eccentric dust seal is of an improved design. Built in many sizes from 8″ to 60″. (*Described in Bulletin 1472.*)

The Newhouse Crusher (left) meets every requirement of secondary crushing. It is a high reduction, large capacity unit with motor direct connected to drive shaft, and is well suited to fit into present installations. It requires little head room and may be suspended from the frame work of a building by cables. Built in four sizes, 5″, 7″, 10″ and 14″. (*Described in Bulletin 1469-C.*)

Bulletin 1473, just printed, describes the complete Allis-Chalmers line of crushing plant machinery. Write for your copy.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

ONLY

Brand of WIRE ROPE bears a SILVER STRAND

. . . THE MARK OF SUPERIOR QUALITY!

As exclusive as the identifying "Silver Strand" is the superior performance and economy of Monitor Silver Strand Wire Rope. Made of the highest quality steel, it is brutally strong, to whip the toughest kind of jobs—while its great abrasion resisting qualities assure far longer life. If you are interested in lower operating costs and greater efficiency—if you want true and proved value—it will pay you to learn in detail what the "Silver Strand" means. Take advantage of the money-saving consultation service offered by our distributors and branch offices.

AMERICAN STEEL & WIRE COMPANY

MONITOR

SILVER STRAND WIRE ROPE

1831

1934

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
94 Grove Street, Worcester

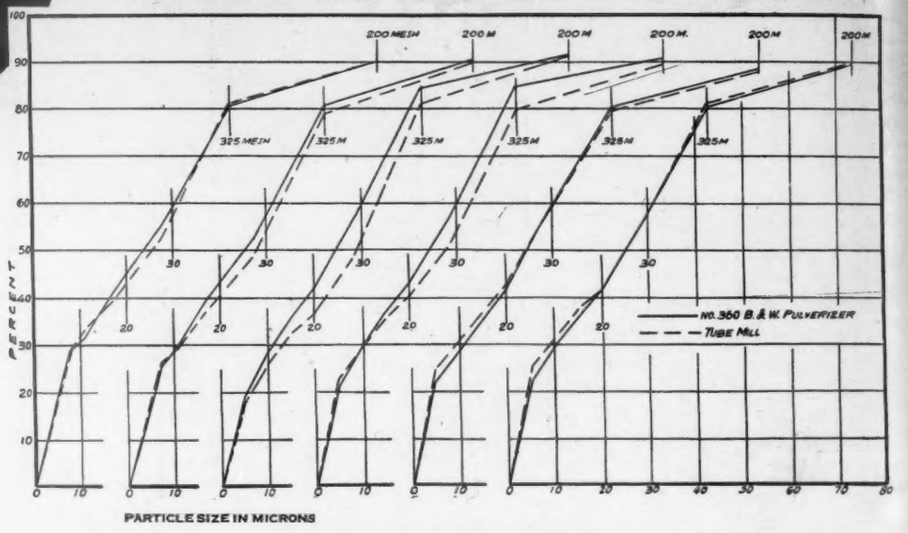
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
AND ALL PRINCIPAL CITIES

Empire State Building, New York
First National Bank Building, Baltimore

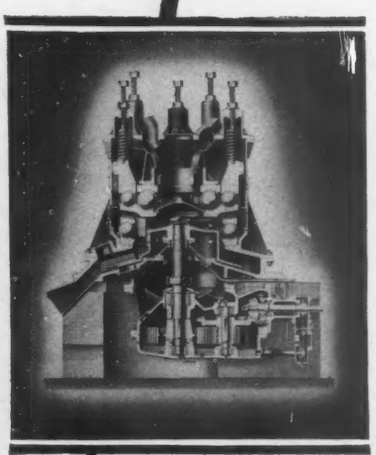
Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

Export Distributors: United States Steel Products Company, New York

MICRON SIZES *with* B&W Pulverizer



Six Representative Comparisons of Particle Size of Cement Ground by No. 360-M B&W Pulverizer and Open-Circuit Tube-Mill



That the B&W Type B Pulverizer can equal or better the open-circuit tube mill in the production of micron sizes of cement is conclusively shown by the chart, on which are plotted the results of a representative series of tests.

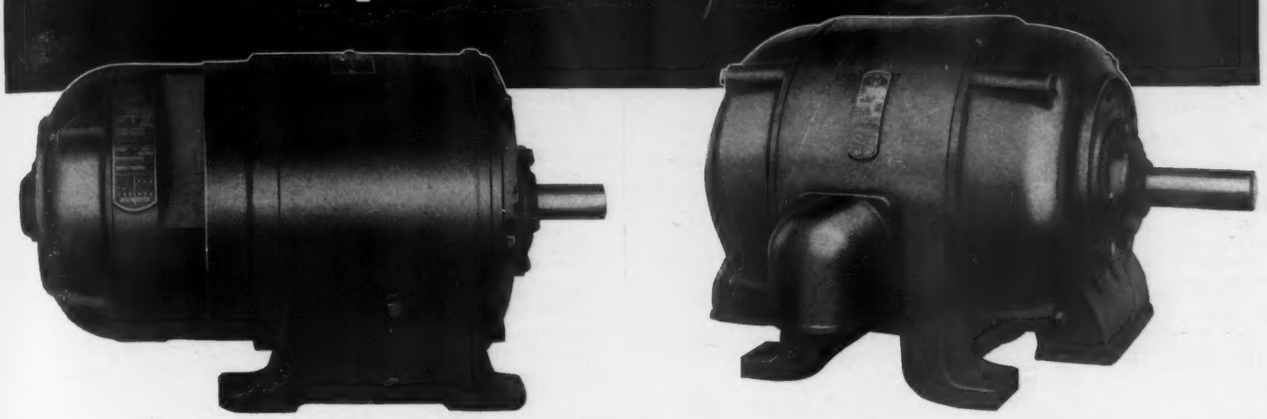
The ability to deliver a product of the fineness indicated is natural to the ball-bearing principle of grinding as adapted in the B&W Type B Pulverizer, because the balls roll spirally in their races, producing both crushing and attrition actions.

Data on these tests and other important information on the B&W Type B Pulverizer are contained in Bulletin F-907-A, a copy of which may be obtained without obligation. Simply write The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y.

BABCOCK & WILCOX

F-251

TWO NEW MOTORS
...both mean *important savings!*



Both of these new type motors mean an important saving in both first cost and operating costs in rock product service.

F-M GEAR MOTORS

The F-M Gear Motor consists of a horizontal motor combined in one unit with a suitable gear-reducing mechanism. The efficiency of the gear reducer is 97% or better. Ratios can be changed quickly and economically if need should arise.

For service where comparatively slow driving speeds are required, the use of the high-priced, less-efficient motor of the slow-speed type is avoided. In addition to these advantages, jack-shafts and other speed reduction methods now out in the open and difficult to maintain, can be eliminated.

F-M SPLASH-PROOF MOTORS

Knowing that the conventional open frame motor with protective housing and called "splash-proof", affords only a *degree* of protection, F-M engineers have built a motor designed from the very outset for maximum protection.

The unique features and thoroughness of protection afforded, have enabled this motor to withstand severe operating conditions in types of service where previously nothing but a totally enclosed motor would suffice!

For rock products service, this motor on such installations means a saving in first cost and a saving in power consumption due to the greater efficiency as compared with the totally enclosed motor.

Send for Informative Bulletins Complete descriptive bulletins on each of these motors on request by addressing Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 32 Branches at your service throughout the United States.

Pioneer Designers and Manufacturers of POWER *104 Years*

FAIRBANKS-MORSE
MOTORS

PUMPING AND WEIGHING EQUIPMENT

6091 EA 05.12

Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

This classified directory of advertisers in this issue is published as an aid to the reader. Every care is taken to make it accurate, but ROCK PRODUCTS assumes no responsibility for errors or omissions. The publishers will appreciate receiving notice of omissions or errors, or suggestions

Acetylene Welding Rod
American Steel & Wire Co.

Agitators, Thickeners and Slurry Mixers
F. L. Smidth & Co.

Air Compressors
Curtis Pneumatic Machy. Co.
Fuller Co.
Gardner-Denver Co.
Nordberg Mfg. Co.
Traylor Eng. & Mfg. Co.

Air Filters
Fuller Co.

Air Hoists
Curtis Pneumatic Machy. Co.

Air Separators
Raymond Bros. Impact Pulv. Co.

Armorite (for Chute Lining)
B. F. Goodrich Rubber Co.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

Backdiggers
Ohio Power Shovel Co.

Backfillers
Bucyrus-Erie Company
Harnischfeger Corp.
Ohio Power Shovel Co.

Ball Bearings
S K F Industries, Inc.

Balls, Grinding (See Grinding Balls)

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.

Bar Benders and Cutters
Koehring Company, Div. of National Equipt. Corp.

Bearings
Chain Belt Co.
Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Roller)
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
S K F Industries, Inc.
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing
Flexible Steel Lacing Co.

Belting
Robins Conveying Belt Co.

Belting (Elevator and Conveyor)
B. F. Goodrich Rubber Co.

Belting (Transmission)
B. F. Goodrich Rubber Co.

Bins
Blaw-Knox Co.
Traylor Eng. & Mfg. Co.

Bin Gates
Chain Belt Co.
Fuller Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Eng. & Mfg. Co.

Blast Hole Drills (See Drills)

Blasting Cap Protectors
B. F. Goodrich Rubber Co.

Blasting Supplies
Hercules Powder Co.

Blocks (Pillow, Roller Bearing)
Link-Belt Co.
S K F Industries, Inc.
Timken Roller Bearing Co.

Blocks (Sheave)
American Manganese Steel Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Boots and Shoes
B. F. Goodrich Rubber Co.

Breakers (Primary)
Smith Engineering Works

Buckets (Dragline and Slackline)
American Manganese Steel Co.
Bucyus-Erie Co.
Wellman Engineering Co. (G. H. Williams)

Buckets (Dredging and Excavating)
Harnischfeger Corp.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Cross Engineering Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Harnischfeger Corp.
Hayward Co.
Link-Belt Co.
Wellman Engineering Co. (G. H. Williams)

Bulldozers
Koehring Company, Div. of National Equipt. Corp.

Bushings (Machined or Processed)
Manganese Steel Forge Co., Inc.

Cableways
American Steel & Wire Co.
Link-Belt Co.
Macwhyte Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Hercules Powder Co.

Car Pullers
Link-Belt Co.
Robins Conveying Belt Co.

Castings
Babcock & Wilcox Co.
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.

Cement Making Machinery
F. L. Smidth & Co.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Central Mixing Plants (Concrete)
Chain Belt Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Manganese Steel Forge Co., Inc.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Chain Belt Co.
Link-Belt Co.

Chain Drives
Chain Belt Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chutes
Cross Engineering Co.
Hendrick Mfg. Co.

Chutes and Chute Liners
American Manganese Steel Co.
Manganese Steel Forge Co., Inc.

Chutes for Minimizing Segregation
Robins Conveying Belt Co.

Clamshell Buckets (See Buckets, Clamshell, Grab, etc.)

Classifiers
Knickerbocker Co.
Link-Belt Co.

Clips (Wire Rope)
American Steel & Wire Co.
Macwhyte Co.
Williamsport Wire Rope Co.

Clutches
Fairbanks, Morse & Co.

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Babcock & Wilcox Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.

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Gardner-Denver Co.

Compressed Air Hoists
Gardner-Denver Co.

Compressors (See Air Compressors)

Controllers (Electric)
Fairbanks, Morse & Co.

Conveyor Idlers and Rolls
Bartlett, C. O., & Snow Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Conveyors and Elevators
Earle C. Bacon, Inc.
Chain Belt Co.
Fuller Company
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Conveyors (Screw)
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Company

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
B. F. Goodrich Rubber Co.
Link-Belt Co.

Cranes (Air Powered)
Curtis Pneumatic Machy. Co.

Cranes (Clamshell)
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Company, Div. of National Equipment Corp.

Cranes (Crawler and Locomotive)
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Company, Div. of National Equipment Corp.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co.

Cranes (Excavator)
Koehring Company, Div. of National Equipment Corp.

Cranes (Overhead Traveling Electric)
Harnischfeger Corp.

Crusher Parts
American Manganese Steel Co.
Pennsylvania Crusher Co.

Crushers (Hammer)
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc. (Jaw)
Gruendler Crusher & Pulv. Co.
Lewistown Fdy. & Mach. Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Crushers (Single Roll)
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Dedusters
Blaw-Knox Co.

Diaphragms (Pump)
B. F. Goodrich Rubber Co.

Derricks and Derrick Fittings
Harnischfeger Corp.

Diesel Engines (See Engines, Diesel)

Dippers (Manganese Steel)
American Manganese Steel Co.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.
Marion Steam Shovel Co.

Ditchers
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Company, Div. of National Equipment Corp. (Gasoline and Electric)
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Marion Steam Shovel Co.
Northwest Engineering Co.

Dragline Excavators
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Harnischfeger Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.
Sauerman Bros.

Dragline Excavators (Walking)
Bucyrus-Monighan Company

Dredge Chain (See Chain)

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Marion Steam Shovel Co.
Morris Machine Works

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Drill Sharpening Machines
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Drills
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Drills (Blasthole)
Loomis Machine Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
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Fairbanks, Morse & Co.

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Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Combustion Engineering Corp.
Traylor Eng. & Mfg. Co.

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Allis-Chalmers Mfg. Co.
Blaw-Knox Co.

Dust Conveying Systems
Fuller Co.

Dynamite
Hercules Powder Co.

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Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.

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Productive Equipment Corp.
F. L. Smidth & Co.
Robins Conveying Belt Co.

ROCK PRODUCTS Circulation

"Circulation" is a patient word. For some publications it means little more than the motion of distribution. ROCK PRODUCTS' circulation is more than motion. It represents an alive connection between the publication and the producers.

We will not talk tritely of quality circulation. But we will gladly pay the cost incident to your asking the substantial producers of the rock products industry their reading preference. ROCK PRODUCTS has been the overwhelming choice in all such tests to date.

A ROCK PRODUCTS SERVICE

ROCK PRODUCTS maintains various lists which, together, make up a complete directory of buying influence in the industry. These lists are furnished at preparation cost to regular advertisers.

Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

330 SOUTH WELLS STREET . . . CHICAGO, ILL.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Engines (Diesel)
Fairbanks, Morse & Co.
Nordberg Mfg. Co.

Engines (Gas, Kerosene, Oil)
Fairbanks, Morse & Co.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Koehring Company, Div. of National Equipt. Corp.

Excavators (Dragline)
Koehring Company, Div. of National Equipt. Corp.

Explosives
Hercules Powder Co.

Fans (Exhaust)
Jeffrey Mfg. Co.

Feeders
Babcock & Wilcox Co. (Pulverized Coal)
Chain Belt Co.
Fuller Co. (Cement and Pulverized Material)
Jeffrey Mfg. Co. (Pan and Tube)
Robins Conveying Belt Co.
Smith Engineering Works (Plate)

Flights
Cross Engineering Co.

Forgings (Steel)
Manganese Steel Forge Co., Inc.

Forges (Oil)
Gardner-Denver Co.

Furnaces
Combustion Engineering Corp.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Gaskets
B. F. Goodrich Rubber Co.

Gates, Bin (See Bin Gates)

Gears and Pinions
Chain Belt Co.
Link-Belt Co.

Gears (Spur, Helical and Worm)
Jeffrey Mfg. Co.

Generating Sets (Diesel Electric)
Fairbanks, Morse & Co.

Grab Buckets (See Buckets, Clamshell, Grab, etc.)

Grapples (Stone)
Hayward Co.

Grease
Gulf Refining Co.

Grinding Balls
Babcock & Wilcox Co.

Grizzlies
American Manganese Steel Co.
Jeffrey Mfg. Co. (Vibrating)
Manganese Steel Forge Co., Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Grizzly Feeders
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Hammer Drills
Gardner-Denver Co.

Hammer Mills (See Crushers)

Hoists
Curtis Pneumatic Machy. Co.
Gardner-Denver Co.
Harnischfeger Corp.
Link-Belt Co.
Northwest Engineering Co.

Hoppers and Spouts
Hendrick Mfg. Co.
Manganese Steel Forge Co., Inc.

Hose (Water, Steam, Air, Drill, Sand Suction and Discharge)
B. F. Goodrich Rubber Co.

Hydrators
Blaw-Knox Co.
Kritzer Co.

I-Beam Trolleys
Curtis Pneumatic Machy. Co.

Kilns and Coolers (Rotary)
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Blaw-Knox Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.

Kominuters (See Mills)

Lamp Guards
Flexible Steel Lacing Co.

Lighters (Hot Wire for Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Co.
Kritzer Co.
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

Linings (Iron for Ball and Tube Mills) (See Mill Liners)

Linings (Rubber for Ball and Tube Mills)
B. F. Goodrich Rubber Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Diesel-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Electric)
Jeffrey Mfg. Co.

Locomotives (Gas Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Geared)
Lima Locomotive Works, Inc.

Locomotives (Oil Electric)
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Plymouth Locomotive Works

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Robins Conveying Belt Co.
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You can cut wire rope costs materially NOW with TRU-LAY, because the wires and strands are preformed in manufacture to take the exact shape of the rope. They lie *relaxed* in the rope body from the time it is first taken from the spool until it has given its last ounce of service.

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American Steel & Wire Co.
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Macwhyte Co.
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Williamsport Wire Rope Co.

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Transmission Machinery
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Kritzer Co.
Timken Roller Bearing Co.

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Cross Engineering Co.

Truck Bodies (Ready Mixed Concrete)
Blaw-Knox Co.

Trucks and Trailers (See Motor Trucks)

Truckmixers
Blaw-Knox Co.

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Tube Mill Liners (See Mill Liners)

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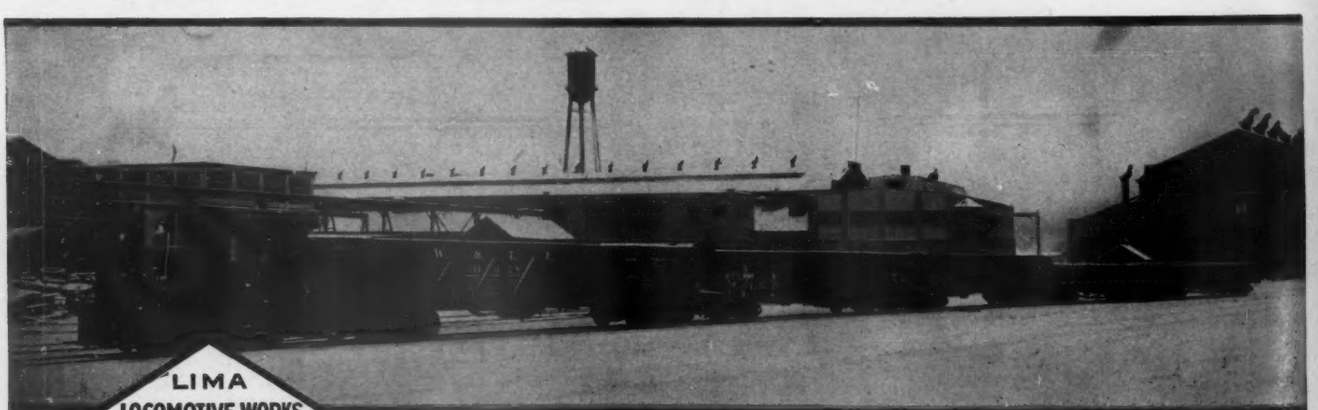
Wire Rope Sockets (See Sockets, Wire Rope)

Worm Gears (See Gears)

On LIMA Gasoline Locomotives ✦ ✦ ✦



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On Lima Gasoline Locomotives, power is transmitted to both axles through gearing to a universal gear drive.

This positive drive to both axles assures greater pulling power for Lima Gasoline Locomotives. Moreover, this distinctive type of Lima drive eliminates all chains, rods and other parts requiring adjustment. And, being on the right side of the locomotive—out in the open—the working parts of the Lima drive are readily accessible for inspection, lubrication and maintenance.

Write for a copy of the new bulletin on Lima Gasoline Locomotives

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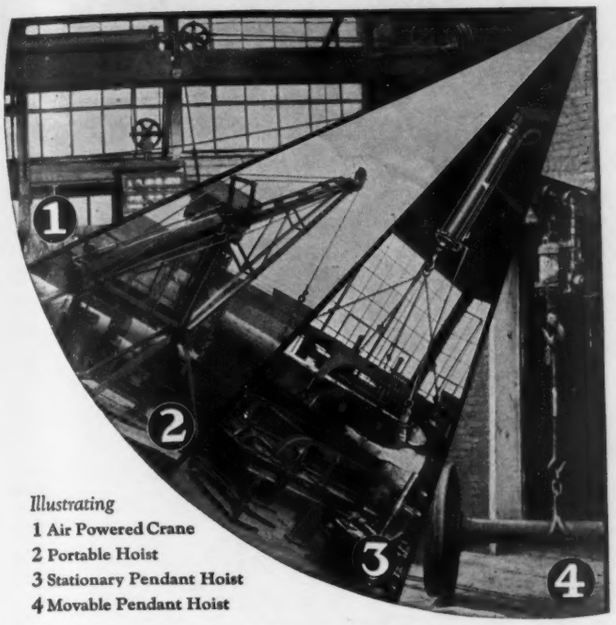


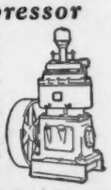
Illustrating
1 Air Powered Crane
2 Portable Hoist
3 Stationary Pendant Hoist
4 Movable Pendant Hoist

Save Money on First Cost *and* Operation

NO MATTER what the condition—if it's a hoist job—the chances are a Curtis will solve your problem. As a matter of fact, the worse the condition the better Curtis Air Hoists show up. They are so simple in construction—so "fool-proof" in operation—so impervious to corrosive and abrasive elements—that they do jobs other hoists can't touch, yet they are inexpensive. For instance—

One man, a common laborer, can operate a Curtis skillfully—operating costs, including power, labor, depreciation and servicing, prove Curtis economy—when an over-load is applied, it simply won't lift; showing it's "fool-proof"—it will spot to a hair's breadth and lift or lower gently, showing perfect control—it pulls, or pushes or does both, showing it's flexible—steam, moisture, acid, fumes, grit, dust and exposure to weather have little or no effect—showing it's dependable.

Curtis Industrial Compressor



3 to 50 h. p. Capacity up to 250 cu. ft. per minute. Water-cooled, controlled splash lubrication, higher speeds, controlled temperature head, low oil consumption, less carbon precipitation. Unloader regulates air pressure. By-pass allows start against no load.

Curtis I Beam Air Crane

10 to 40 foot span, ½ to 10 ton capacity. Light, strong pressed steel construction, flexible roller bearings. Successfully operated by any workman in combination with Curtis Hoists and I Beam Trolley. Easy-running, strong and safe.

Curtis Air Hoists cost only ⅓ the price of ordinary power hoists, or little more than a chainblock. If you've a hoist job you want done, investigate Curtis Air Hoists before you buy.

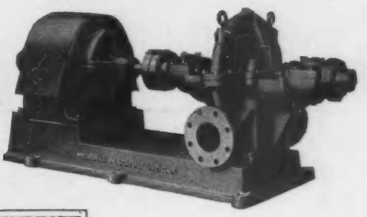
Curtis Pneumatic Machinery Company, 1988 Kienlen Ave., St. Louis, Mo. 5518AI Hudson Terminal, New York City

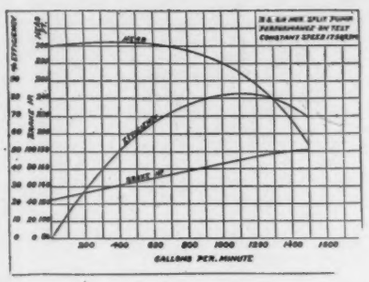
CURTIS

NRA MEMBER U.S. WE DO OUR PART

COMPRESSORS—AIR HOISTS
I-BEAM CRANES and TROLLEYS

Higher efficiencies *for* Centrifugal Pumps





NRA MEMBER U.S. WE DO OUR PART

THE last few years have witnessed tremendous strides in the design of double-suction horizontally-split centrifugal pumps. Hydraulic and mechanical losses which formerly were considered unavoidable in centrifugal pump operation have now been greatly reduced through increased knowledge of the flow of liquids in pump impellers and volute casings, advances in the design of both steady bearings and thrust bearings, and greater accuracy in machining and finishing processes.

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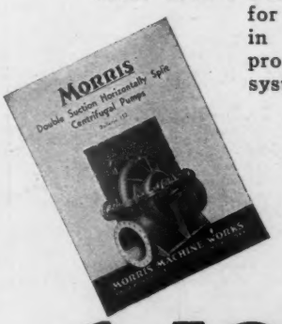

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Prevent Blinding
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ROL-MAN'S flat surface has enough roughness to thoroughly tumble material but not enough to retard its fast flow over the screen surface.

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New Low Prices Are Now Effective on ROL-MAN—The World's Highest Quality Screen.

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A "2 *in* 1" *Mesh*

"Sqround" Mesh, as its name indicates, is a square-round mesh which incorporates the advantages of both types of openings.

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"Sqround" mesh gives *accurate* sizing with very little reduction in the open area of the screening surface.

Sqround Mesh is available in any size mesh required in flat plate or in Hendrick Double Corrugated Plate. May we quote you?

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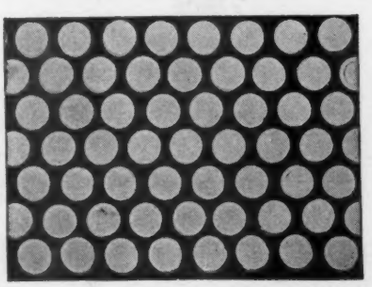

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Only those Crushing Plants equipped with a REAL DUST COLLECTING SYSTEM are in a position to reap these by-product profits.

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BLAW-KNOX *Dust Collectors*

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"Never Lets Go"

ALLIGATOR

TRADE MARK REG. U.S. PAT. OFFICE

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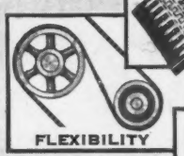

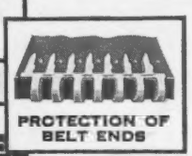

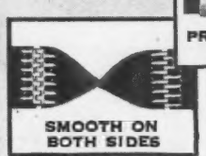

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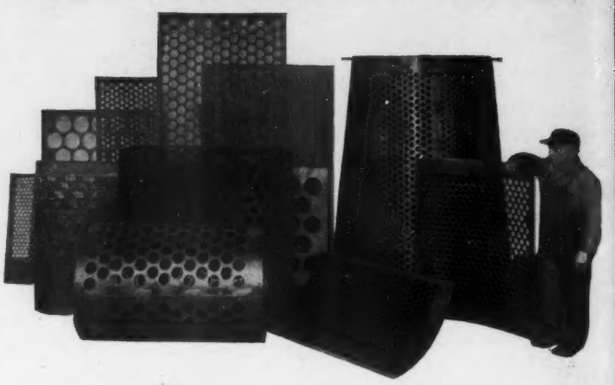

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Rock Products Industry

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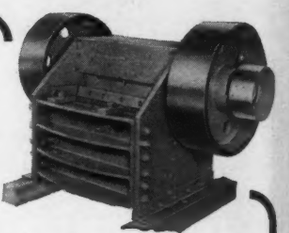
GRUENDLER JAW CRUSHER



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Because OUTLAST OTHERS—WON'T BLIND—HAVE LARGE CAPACITY—SIZE MORE ACCURATELY and COST LESS EVENTUALLY. They are made of high carbon alloy steel or our special CM5 metal, in plain or indented types and fit all makes of vibrating screens.

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are no better than their Raw Materials

Hercules makes many of its own ingredients and maintains the same strict control of quality over the others which it buys. Although these materials are made under strict specifications, all are subjected to final chemical and physical analysis at plants before they can be used in Hercules dynamite. In no other way can we attain the degree of reliability that characterizes Hercules explosives.

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Single, Double Roll Crushers—Super Dry Pans—Steel Log Washers and Scrubbers—Dryers—Jigs—Screens—Hoists, Elevators and Conveyors—Reciprocating Feeders, Bingates, Chutes, Turn Tables, Elevator Buckets, Car Pullers, Rail Straighteners, Cast Parts, Rough or Finished—Car Wheels and Brake Shoes, Sprockets and Sheaves, Gears and Bearings, Gratings and Columns, Chute Linings, Grate Bars of Special Heat-Resisting Metals.

Write for catalogues listed or for information concerning any of the material, machinery and castings listed, required in mine, quarry or pit.

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Manufacturers—Founders—Machinists
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KNICKERBOCKER Soft Stone Eliminator

Handles 50 to 90 tons of gravel per hour. Eliminates shale, ochre, sandstone, sailers, chalk, lignite. Makes soft stone restrictions in specifications easy to meet—adds new jobs, new profits on every job. Write for circular.

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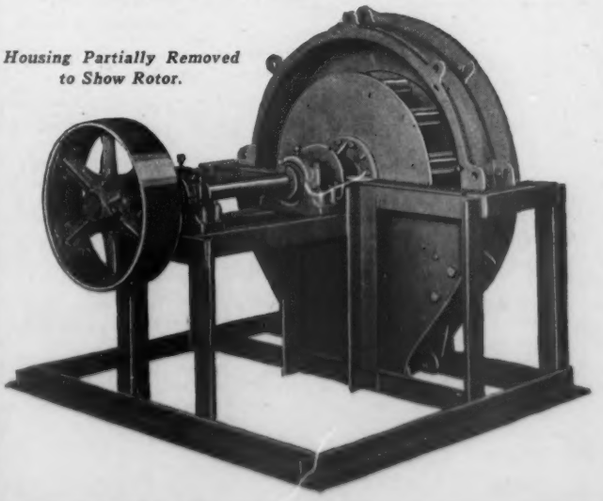

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Spiral Screw and Log Washers, De-Waterers and Shale Removers, Flume Classifiers, Swintek Ladder Suction Screen Nozzles, Chain Type Cutters, Barges and Pontoons, A Frame and Gantry Hardware, Vibrating and Revolving Screens, Steel Dump Cars, Grizzlies, Car Wheels and Trucks, Steel Bins, Water Tanks, Structural Towers, and Dry Pans.

EAGLE IRON WORKS
Machinists — Founders
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STEAM LOCOMOTIVES ASME BOILERS

60-ton Porter 6-wheel saddle tank.
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25-ton standard gauge Plymouth.
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1—13-A Telsmith Gyratory Crusher.
1—P & H Model 600 Shovel 1 yd.
1—½ Yd. General Shovel-Crane.
1—1¼ Yd. Osgood Gas Shovel.
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Jaw Crushers 10x18, 15x36, 18x30.

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FOR SALE—Factory Rebuilt Horizontal Buckeye Oil Engines. 1, 65 H.P.; 1, 260 H.P.; 1, 200 H.P. Vertical Buckeye Full Diesel; all engines furnished with or without generators or belt driving equipment. Also 1 50 H.P. reconditioned Muncie Oil Engine. Liberal terms. Write today.
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Page Walking Dragline Crane, 75 h.p. Diesel Engine, 60-ft. Boom, 2-yd. Bucket, good condition.

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Marion Gas Electric ¾-Yard Shovel.
1-Yd. Osgood Crawler Shovel, rebuilt.
Side and Center dump cars.
Locomotives—75-ton Switcher, code boiler—saddle tank type, 18 to 65 tons.
Cranes and Draglines, various sizes.

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CONSOLIDATED offers GOOD USED CRUSHING, PULVERIZING, DRYING AND FILTERING EQUIPMENT—COMPLETE

Crushing Plants; Diesel, Gasoline, Electric Cranes and Shovels; Hoists; Compressors; Pumps; Dragline and Excavating Equipment; and all sizes and types of Jaw, Gyratory and Roll Crushers; Swing Hammer Mills; Elevators; Belt Conveyors; Rotary and Vibrating Screens; Rotary Kilns and Dryers; Raymond and other fine Pulverizers; Air Separators; Hardinge Ball and Pebble Mills; Silex and iron lined Tube Mills, etc. Send for Bulletin No. 14.

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Tel. Barclay 7-0600 Shops and Yards at Newark, N. J., now covers eight acres

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FOR SALE

Farrell Jaw Crusher, type B, 18x36".
Reliance Jaw Crusher, 9'x16", with 30' elevator.
Jeffrey No. 3 Lime Pulverizer, type D.
80' Belt Elevator, with 140—30" buckets attached.
S-A Belt Conveyor, 20" wide, 130' long.
S-A Belt Conveyor, 32" wide, 80' long.
Revolving Stone Screens, 40"x18' & 60"x20'.
Portable Track, 3,000 ft.—24" gauge.
American 4" Centrifugal Pump to 15 H.P. 4-cyl. engine.
Lawrence 8" two-stage Centrifugal Pump, to 150 H.P. A.C. motor.
170 ft. 32" Conveyor Belt, 12-ply rubber covered.
I. R. steam-driven, two-stage Comp., 446'.
Gardner-Denver steam-driven Comp., 571'.
Hayward ⅜-yd. Clamshell Digging Bucket.
Haiss ½-yd. Narrow Clamshell Digging Bucket.
Chisholm & Moore 10-ton Cyclone Chainhoist.
Electric and Gasoline Hoisting Engines.
Northwest Crane, 40-ft. boom.
Koppel 4-yd. 36" gauge side-dump cars.

G. A. UNVERZAGT, 15 Park Row, N. Y. C.

FOR SALE

1—Model 40 Telsmith reduction crusher, good as new.

Coogan Gravel Company
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WANTED

One second-hand Main frame, in good condition, for No. 8 Austin Gyratory crusher, or would purchase entire No. 8. crusher if price is satisfactory.

Newton County Stone Co.
Kentland **Indiana**

WANTED—12 2-yard 36" gauge standard, low-type Koppel Rocker Quarry cars or similar end-dump steel quarry cars.

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POSITIONS VACANT

Superintendent wanted for lime plant located in eastern Pennsylvania. Only qualified man having production experience and good education will be considered. Address Box 612, care of Rock Products, 330 South Wells St., Chicago, Illinois.

WANTED — EXPERIENCED LIMESTONE mine foreman. Must be capable of carrying on development work in new mine. References covering experience and ability required. Address Box 614, care of Rock Products, 330 So. Wells St., Chicago, Ill.

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Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.
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H. D. RUHM
Consulting expert on phosphate matters. Correspondence solicited. Will advise as to use of and furnish all brands and grades of phosphates.
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Owner of large and rich deposit of Diatomaceous Earth wishes to establish connection with responsible party for development of Mine or for manufacturing purposes. Mine located one and a half miles from railroad station, fifty miles from San Francisco. An analysis of this earth shows that it contains Silica—90.25%, Ferric Oxide—1.21%, Aluminic Oxide—3.73%, Calcium Oxide—1.07%. Magnesium Oxide 1.26%. Write to Mr. H. R., 624 Euclid Avenue, San Francisco.

For lease or sale, established gravel business with orders on hand and in view, on profitable basis. Owner has other interests. Good business opportunity. ILLINOIS MINERALS CO., Cairo, Ill.

If you have a business to sell or lease, or if you wish to buy or lease a business, you will be doing yourself a good turn by placing an advertisement in this department.

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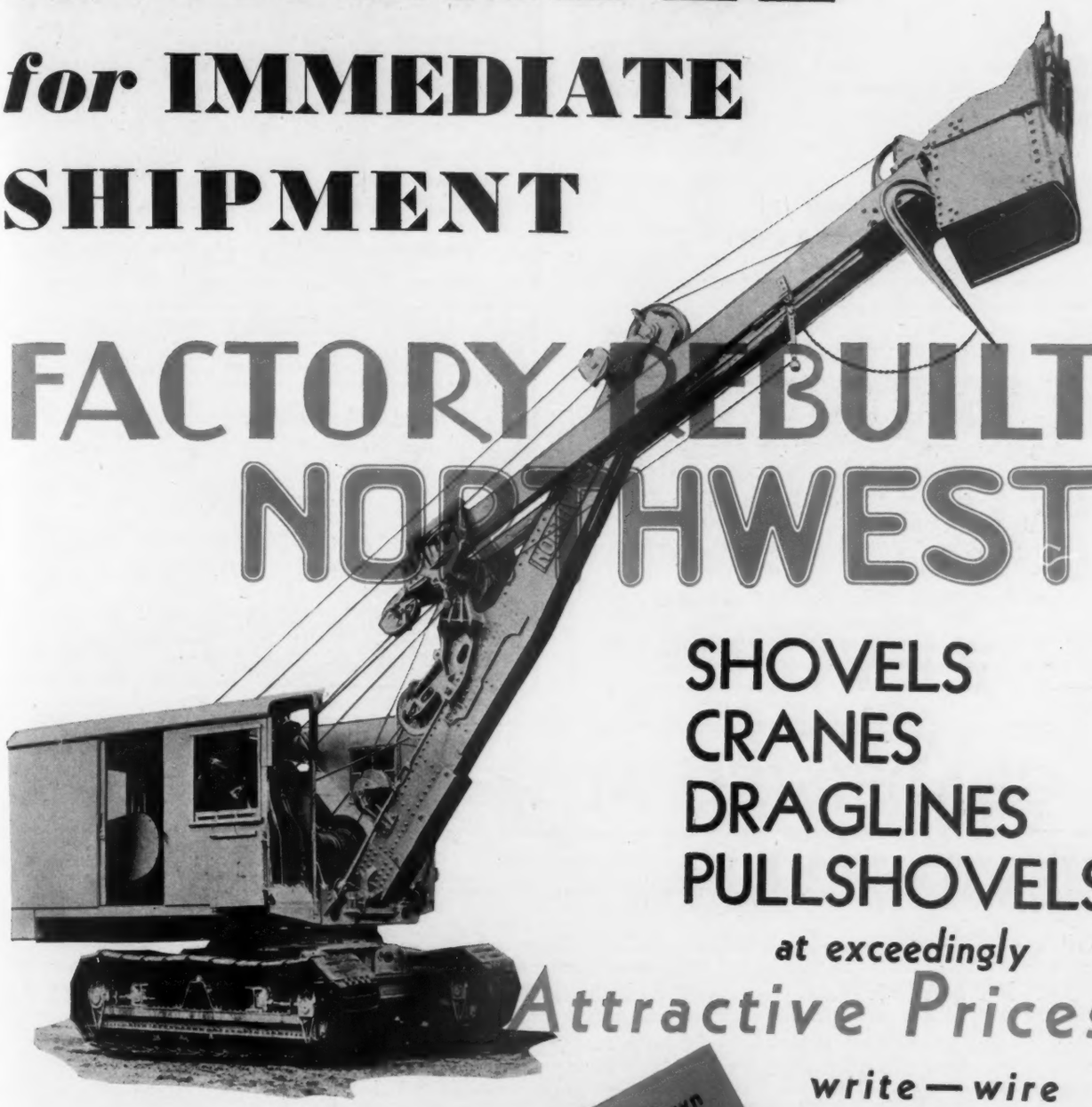

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SHOVELS
CRANES
DRAGLINES
PULLSHOVELS

at exceedingly

Attractive Prices

write — wire or phone!

These Machines have been completely torn down and rebuilt from the ground up. They have been inspected and tested and carry the same guarantee as to materials and workmanship as a new machine. Perhaps this is the solution to the problems in that job you are figuring.

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Gentlemen: I am interested in a rebuilt machine of the type checked below. Please send complete information without obligating me in any way.

Name.....

Address.....

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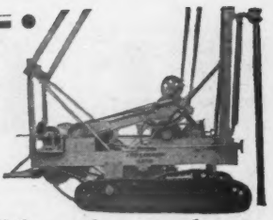
☐ Shovel ☐ Crane ☐ Dragline ☐ Pullshovel

SPEED, PLUS ECONOMY

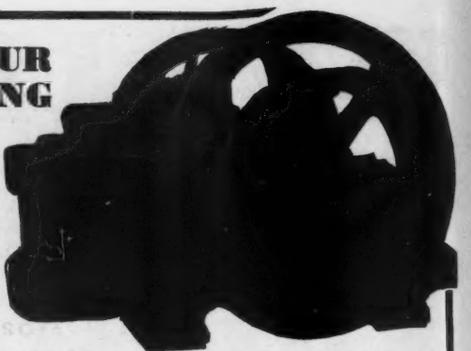


The New Loomis "Clipper" is a faster, more rugged drill of the full-length crawler type. It is designed for maximum results at lowest cost. It is equipped for Wire or Manila Line.

Write if Interested

THE LOOMIS MACHINE CO.
K Street, Tiffin, Ohio

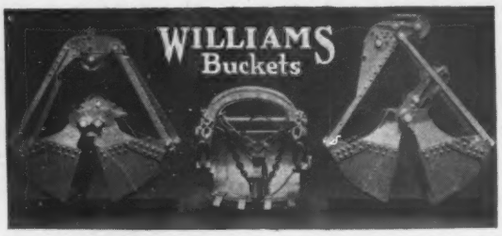
CUT YOUR CRUSHING COST



MANY an operator is cutting his crushing costs and maintaining production schedules with this most dependable crusher. Simple but sturdy, this efficiently designed crusher represents an exceptionally profitable investment in equipment of this type.

Lewistown Foundry & Machine Company
LEWISTOWN, PENNA.

Increase Crane Output *with*



Multiple-Rope Dragline Power-Arm
Write for bulletins
THE WELLMAN ENGINEERING CO.
7008 Central Ave., Cleveland, Ohio

Perforated Metals — Screens of All Kinds — For Sand, Gravel, Stone, Etc.

MATERIAL IN STOCK
PROMPT SHIPMENT

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GENERAL CEMENT PLANT OPERATOR—Qualified to assume full charge of any size plant. 18 years' actual experience as assistant chief chemist, quarry, mill, kiln, packing, maintenance, and construction foreman. 8 years full charge of all plant operations, maintenance and control of 8,000-barrel plant without rejection and very low operating cost. Location and position to start immaterial. Address Box 603, care of Rock Products, 330 South Wells Street, Chicago, Ill.

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POSITIONS WANTED

POSITION WANTED AS SUPERINTENDent, with a progressive stone company; 20 years' practical experience operating limestone quarries and crushing plants. Familiar with modern machinery, efficient handling of labor and equipment, low cost of production. Qualified to assume full charge of any size plant. Now open for engagement. Unquestionable references. Address Box 560, care of Rock Products, 330 S. Wells St., Chicago, Ill.

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OPEN FOR POSITION AS OPERATOR OR manager of lime or stone plant. Would consider small investment in a company of suitable rating. Address Box 602, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

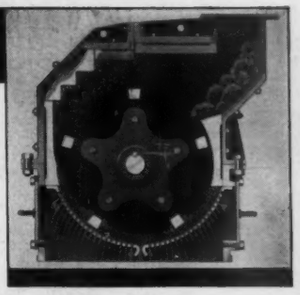
POSITIONS WANTED

WANTED—POSITION WHERE THERE IS an opportunity for advancement by Chief Chemist now employed. Five years' practical mill experience and eight years as either Chief or Supervising Chemist and Asst. Supt. Accustomed to foreign service. Speaks Spanish fluently. Married. Will go anywhere. Familiar with both U. S. and European practice. Address Box 606, care of Rock Products, 330 South Wells St., Chicago, Ill.

POSITION WANTED BY PRACTICAL PROduction superintendent; 24 years' experience designing, building and operating large stone, slag and gravel plants. Have always reduced costs. 17 years with one concern and subsidiary as superintendent and district superintendent. Unquestionable references. Address Box 613, care of Rock Products, 330 So. Wells Street, Chicago, Ill.

OPERATING MANAGER. EXTENSIVE executive experience in stone and slag operations, plant layout and construction. Graduate engineer. Particular ability in effecting operating economies. Address Box 615, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

Crushers



- Cyclo Crusher Pulverizers are inexpensive. They are equipped with Timken Bearings, manganese steel hammers, fly wheel, cast steel breaker blocks and are completely lined with hard iron wearing plates. Capacities 1 to 25 tons per hour when crushing to 10 mesh or finer.

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THE C. O. BARTLETT & SNOW CO.
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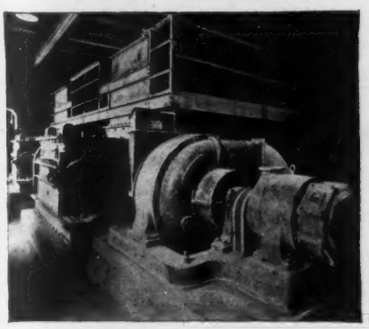
"PENNSYLVANIA" STEELBUILT HAMMERMILLS



installed in the largest Cement Plant in the British Empire. Five other plants of the same Company are "Pennsylvania" equipped.

PENN-PRIMARY Hammermills, PENN-LEHIGH PRIMARY ROLLS, PENNSYLVANIA-BUCHANAN Jaw Crushers, "PENNSYLVANIA" Secondary and Fine Reduction Hammermills meet every raw side-crushing need.

Unbreakable Steel Construction
Positive Tramp Iron Protection

PENNSYLVANIA CRUSHER COMPANY
Liberty Trust Bldg.
PHILADELPHIA

Put Your Reduction Problems Up to Us New York Pittsburgh Chicago

BACON FARREL CRUSHERS

SIZES 10"x 7" to 72"x 54"

Complete Plants Designed and Equipped. Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment. Engineering Service.

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LOWEST COST PER CUBIC YARD
Excavates and Conveys Long Distances

Sizes: ⅓ to 15 cu. yd.

Handling up to 6,000 cu. yd. per day.

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For digging from wet or dry deposit, for stripping, for storing and reclaiming any bulk materials.

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Write for interesting 40-page catalog.

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SHOVELS-CRANES-CLAMSHELLS-DRAGLINES
3-4 yd., 1 yd., 1 1-4 yd., 1 1-2 yd. and 1 3-4 yd.
(A TYPE AND SIZE FOR EVERY JOB)

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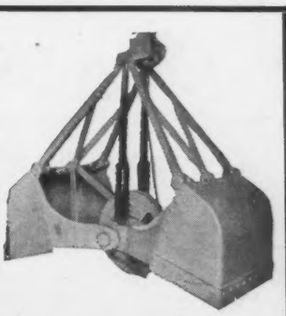
The Hayward Class "E" Clam Shell Bucket grabs capacity loads every time and without spilling carries swiftly to a clean, free discharge. Bulletin 650 gives complete information.



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202-204 Fulton St., New York, N. Y.

Hayward Buckets

THE editorial library of Rock Products contains practically every obtainable treatise relating to the production of stone, sand, silica, phosphate rock, gypsum and other non-metallic minerals and on the manufacture of cement, lime, gypsum products, etc. The editors are technical men and are familiar with these books. Our library of manufacturers' literature is as complete and up-to-date as possible. Rock Products welcomes inquiries, and our facilities are ever at the disposal of our subscribers and advertisers.

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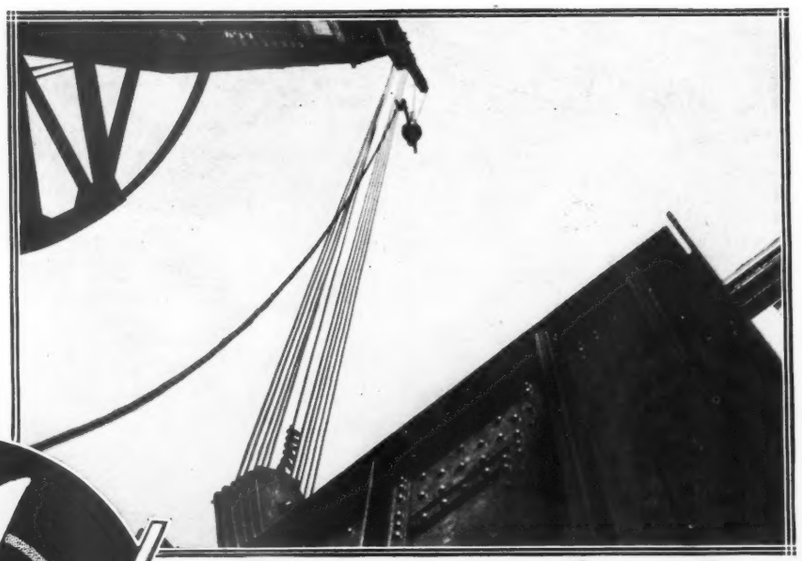

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You'll find in Williamsport Wire Rope a small "Telfax" tape, which tells facts about the kind of steel used in that particular rope—That's important because it means *Safety*—It means you *know* whether you are getting a rope of low tensile strength into service where one of high tensile strength is required. You just cannot get this in any other make of rope but Williamsport.

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